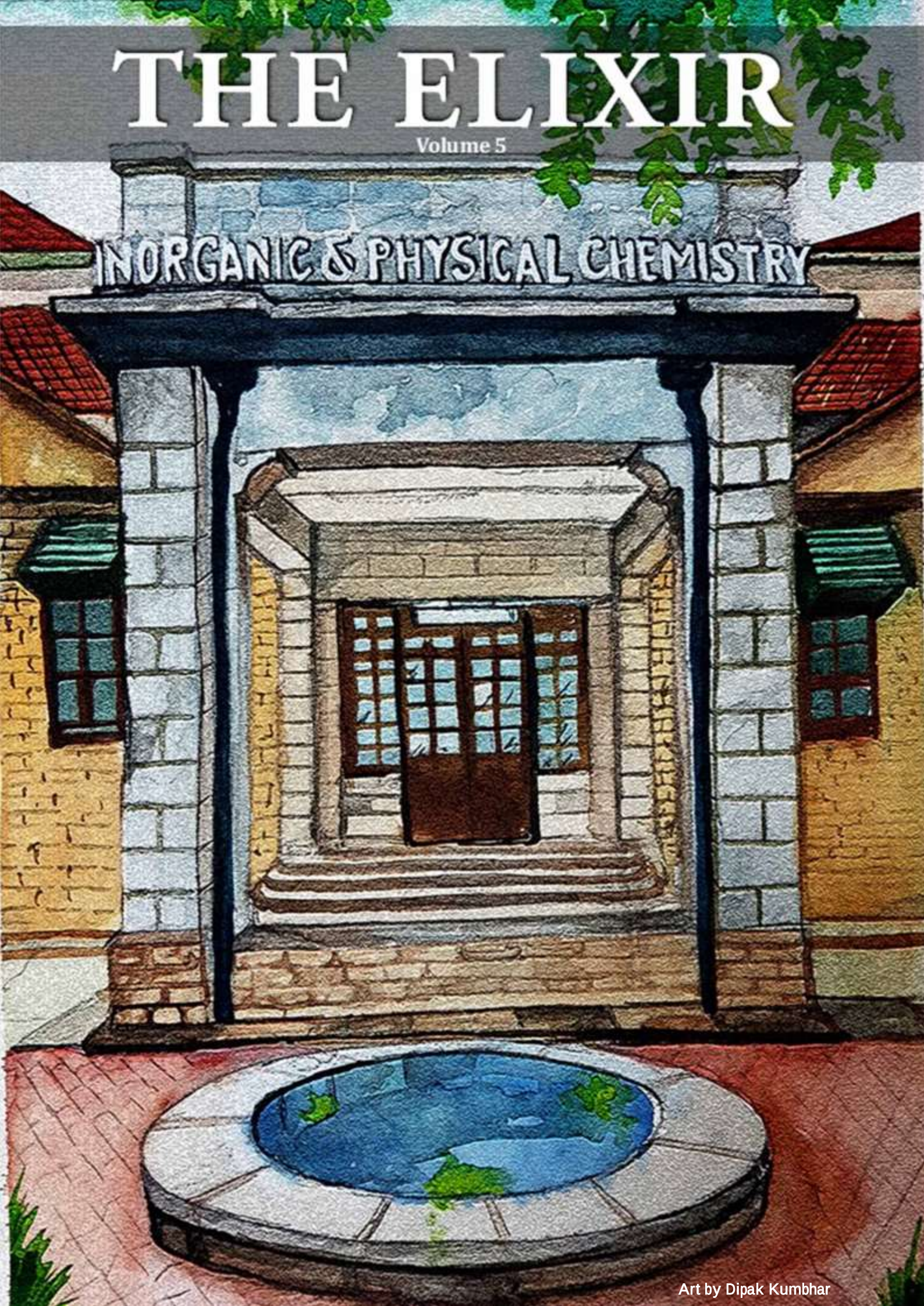
THE ELIXIR

Volume 5



Art by Dipak Kumbhar

Art by Sohel Reja

The Elixir Kitchen

Maitre Chef

Sai G Ramesh

Les Chefs

Debashis Tripathy, Dipak Kumbhar, Rekha P. T., Gopika Krishnan, Mrinal Arandhara, Kamla Devi Netam, Garima Tiwari, Subharaj Hossain, Saibalendu Sarkar, Md Kausar Raza.

CONTENTS

PASSING THE TORCH

Binny Cherayil

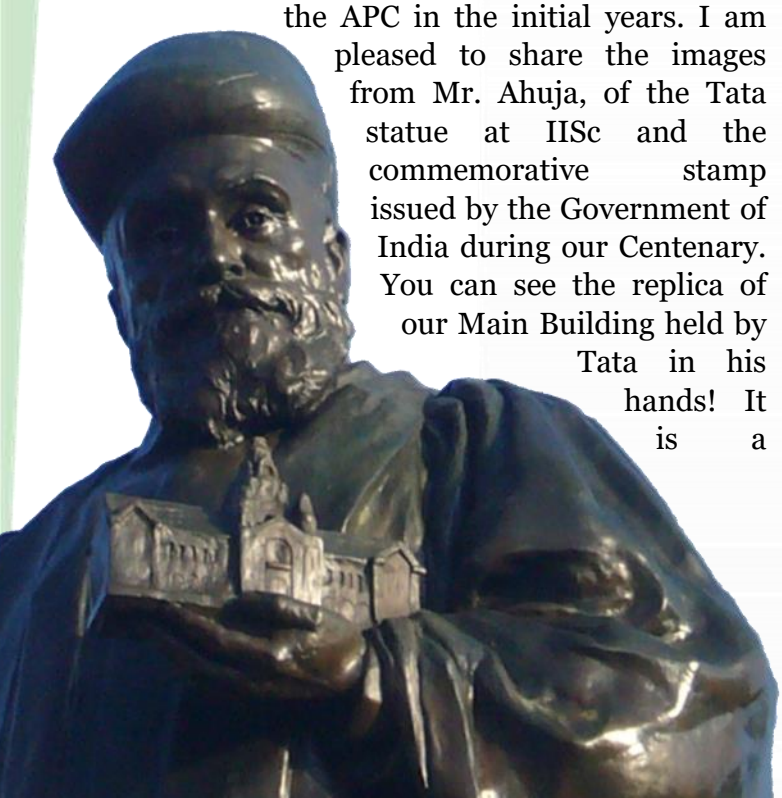
Thirty odd years – that's how long it has been,
Since this fickle old mag first entered the scene
As a disheveled broadsheet just a few pages thick,
In plain Roman font that was totally unchic.
No wonder it soon had to exit this place;
What's left are the words *Requiescat in Pace*.
But those obits were early, there was more to be said;
The paper, like Laz'rus, managed to rise from the dead;
And in colour no less, in a fancy new format,
No longer malnourished, but solid and fat.
But to keep it this way, as a going concern,
Much work will be needed by the new comintern
Whose chief is well-known, his name's Sai Ramesh,
He has muttonchop whiskers, like ole Gilgamesh.
He'll be ably assisted by IPC's best;
When he fails to deliver, they'll all do the rest.
So as Elixir returns with these new kids in town,
I'm hoping they'll labour to not put it down.
But I'll still tend to worry, since as everyone knows,
Plus ça change, plus c'est la même chose.

J N Tata planned the Indian Institute of Science & Swami Vivekananda did not influence it!

E. Arunan

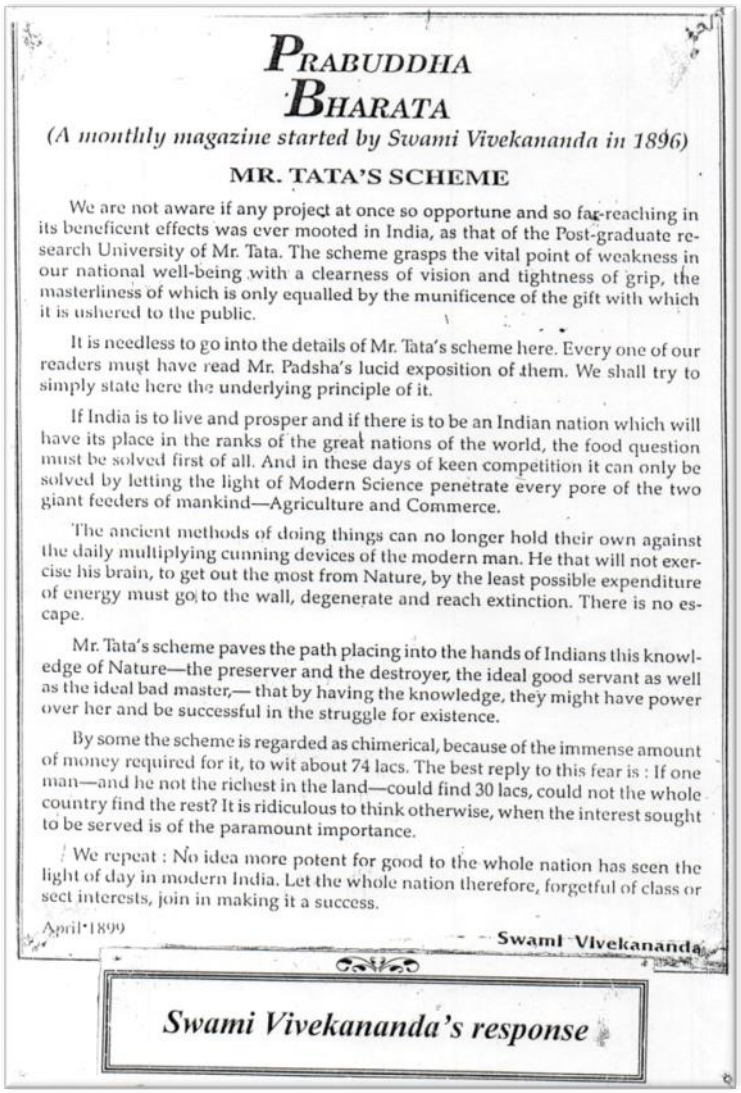
It has become a popular myth that Indian Institute of Science resulted from a stimulating discussion between J N Tata and Swami Vivekananda, while on a ship from Yokohama to Vancouver. A recent post in TheBetterIndia mentions that they met on 31 May in 1893.[1] If one is not careful in reading this post, the myth will resonate as a fact. I have written a few blogs about learning history and pointed out that it can be a difficult task.[2-4] I also believed in this myth and have stated it as a fact in my first blog on Learning History[2] as well as my recent editorial in Current Science focusing on conflict of interest[5]. I had email discussions with two experts: Dr. Subbarayappa, who authored a book on the history of Indian Institute of Science[6], and Prof. P. Balaram, our former Director, who ensured that we have an Archives and Publications Cell (APC) at IISc. I have also been helped by Mr. Sharath Ahuja, who took care of the APC in the initial years. I am pleased to share the images from Mr. Ahuja, of the Tata statue at IISc and the commemorative stamp issued by the Government of India during our Centenary. You can see the replica of our Main Building held by Tata in his hands! It is a fitting statue for the founder in front of the iconic building shown in the stamp.

IISc Centenary Commemorative Stamp (courtesy: Sharath Ahuja)



The book titled *A comprehensive biography of Swami Vivekananda* written by Sailendra Nath Dhar, former Professor of History at Holkar College, Indore, gives some brief information about the voyage.[7] It does mention Mr. Chhabildas, who hosted Vivekananda once in Bombay, and J. N. Tata as fellow passengers. However, according to this book, Vivekananda mostly interacted with the Captain of the ship during the travel and did not have anyone else for company. However, the letter written by J. N. Tata to Swami Vivekananda, on 23rd November 1898, offers the most important clue. This is reproduced in the book by Subbarayappa[6] and also the TheBetterIndia portal[1]. This is what Tata says at the beginning: "I trust, you remember me as a fellow-traveler on your voyage from Japan to Chicago. I very much recall at this moment your views on the growth of the ascetic spirit in India, and the duty, not of destroying, but of diverting it into useful channels." Clearly, he does not mention about any discussion about the need for a research institution. On the other hand, Tata continues this sentence with: "**I recall these ideas in connection with my scheme of Research Institute of Science for India,** of which you have doubtless heard or read" (emphasis added).

Tata in his letter went on to say the following: "I am of opinion that if such a crusade in favour of an asceticism of this kind were undertaken by a competent leader, it would greatly help asceticism, science, and the good name of our common country; and I know not



PRABUDDHA BHARATA

(A monthly magazine started by Swami Vivekananda in 1896)

MR. TATA'S SCHEME

We are not aware if any project at once so opportune and so far-reaching in its beneficent effects was ever mooted in India, as that of the Post-graduate research University of Mr. Tata. The scheme grasps the vital point of weakness in our national well-being with a clearness of vision and tightness of grip, the masterliness of which is only equalled by the munificence of the gift with which it is ushered to the public.

It is needless to go into the details of Mr. Tata's scheme here. Every one of our readers must have read Mr. Padsha's lucid exposition of them. We shall try to simply state here the underlying principle of it.

If India is to live and prosper and if there is to be an Indian nation which will have its place in the ranks of the great nations of the world, the food question must be solved first of all. And in these days of keen competition it can only be solved by letting the light of Modern Science penetrate every pore of the two giant feeders of mankind—Agriculture and Commerce.

The ancient methods of doing things can no longer hold their own against the daily multiplying cunning devices of the modern man. He that will not exercise his brain, to get out the most from Nature, by the least possible expenditure of energy must go to the wall, degenerate and reach extinction. There is no escape.

Mr. Tata's scheme paves the path placing into the hands of Indians this knowledge of Nature—the preserver and the destroyer, the ideal good servant as well as the ideal bad master,— that by having the knowledge, they might have power over her and be successful in the struggle for existence.

By some the scheme is regarded as chimerical, because of the immense amount of money required for it, to wit about 74 lacs. The best reply to this fear is : If one man—and he not the richest in the land—could find 30 lacs, could not the whole country find the rest? It is ridiculous to think otherwise, when the interest sought to be served is of the paramount importance.

We repeat : No idea more potent for good to the whole nation has seen the light of day in modern India. Let the whole nation therefore, forgetful of class or sect interests, join in making it a success.

April 1899 — Swami Vivekananda

Swami Vivekananda's response

Courtesy: Sharath Ahuja

who would make a more fitting general of such a campaign than Vivekananda." Tata clearly wanted Swami Vivekananda to lead the Institute. In his book, Dr. Subbarayappa mentions that Swami Vivekananda's reply to the letter by Tata could not be traced. However, an Editorial was published in April 1899 in Prabhuddha Bharata, a magazine started by Swami Vivekananda. The editorial is not signed and perhaps was written by the Swami. It starts with this sentence: "We are not aware if any project at once so opportune and so far reaching in its beneficent effects was ever mooted in India, as that of the post-graduate research University of Mr. Tata. The scheme grasps the vital point of weakness in our national well-being with a clearness of vision and tightness of grip, the masterliness of which is only equalled by the munificence of the gift which is ushered to the public." The scanned image of the editorial can be seen in the Figure enclosed.

Prof. Balaram gave an excellent talk on the history of the Indian Institute of Science at the National Centre for Biological Sciences recently. Thankfully his talk is available on YouTube[8]. I would encourage anyone interested in the history of Indian Science in 20th Century, not just IISc, to listen to this talk spending the 90+ minutes! Prof. Balaram quotes from primary sources about J. N. Tata's plans for Science and a research Institution in India years before he met Swami Vivekananda during his voyage to Chicago. Why then did Prof. Balaram decide to include Swami Vivekananda in the commemorative stamp during the centenary of IISc? His talk has some clues as to how this happened. If you are keen, you may listen to the talk.

Clearly, Swami Vivekananda recognizes IISc as an outcome of a project mooted by Tata and was very enthusiastic of this project. He was invited by Tata to be the first head of the Institution. However, it is clear that Indian Institute of Science was the result of J. N. Tata's vision and this vision was not influenced by any discussion with Swami Vivekananda. J. N. Tata not only planned IISc, he also built steel and power plants to help India become what it is today. One cannot celebrate IISc or India without celebrating the great J. N. Tata.

1) https://www.thebetterindia.com/127599/swami-vivekananda-jamsetji-tata-chicago-conference-iisc/

2) https://earunan.org/2015/04/02/learning-history/

3) https://earunan.org/2015/04/11/learning-history-ii-and-happy-new-year/

4) https://earunan.org/2015/04/14/learning-history-3-birthday-new-year-and-so-on/

5) E. Arunan, *Curr. Sci.* 2018, 114, 1385-1386.

6) B. V. Subbarayappa "In Pursuit of Excellence: A History of The Indian Institute of Science" Tata-McGraw-Hill 1992, p 21.

7) S. N. Dhar "A comprehensive biography of Swami Vivekananda Part 1", Vivekananda Kendra Prakashan, 1975, p 535.

8) Talk by P. Balaram at NCBS, Bangalore

A HORRENDOUS AFFAIR

Saibalendu Sarkar

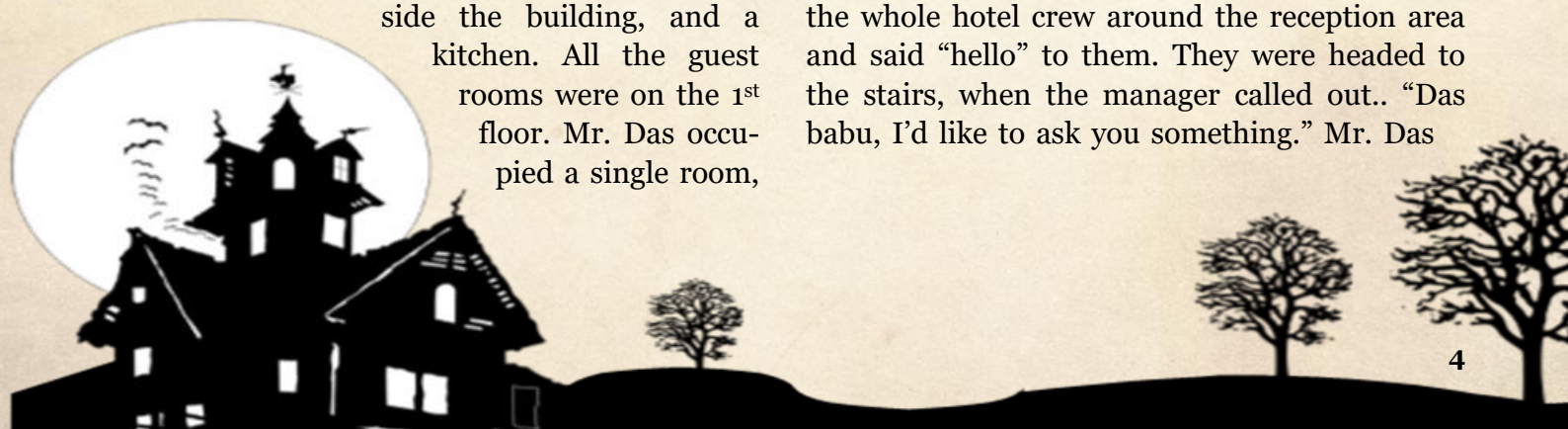
Do I call this a thriller, or the *sab achche ke liye hota hai* sort of tale? Not sure, but it's a true story. All the characters in this story are real and hence I must change their names. Luckily, the list is short: just three. The lead character happens to be one of my very own kith and kin, so I am delighted to express his bravery and intellect in a time of deep distress. Each part of the story is rooted in the actual events that took place, but I've taken the liberty to spice it up a bit.

Arjuna used to work for a well-established chit-fund in the 90s, which doesn't exist today. The regional manager of the company's home branch at the time was a certain Mr. Das. After rigorous work for 4-5 years, Arjuna was able to gain the trust of Das babu, and they made trips for many marketing assignments together. But this time, it was a special trip. They were targeting a huge market to meet company's expectations: people with many acres of lands earning in lakhs from tea estates. It was at a day's drive from the home branch, and the office had a private vehicle for just such journeys, a brand-new Maruti Gypsy. The third member of the journey was the company's official driver, Bahadur. At first look, the most noticeable thing in Bahadur was his height, just 5'4", but no one could underestimate his bravery and strength. He used to work for the army as a driver, but he lost the thumb of his right hand during a shootout, and so lost his job, too.

They had booked to stay at a newly built hotel, Vasundhara, chosen specifically as it was at the centre of all the sites they had to go to for business meetings. This hotel was not in a city, and there were no nearby tourist attractions. And it was not big like a city hotel would be. It was just a two-storey building, with the ground floor having the reception, parking inside the building, and a kitchen. All the guest rooms were on the 1st floor. Mr. Das occupied a single room, while Bahadur and Arjuna shared one room. All five staff including the manager lived at the hotel. Two of the staff shared another room on the 1st floor, the cook slept in the kitchen, the manager had a separate room at the back of the hotel, while the remaining staff slept in the reception area. A barebones, unfussy hotel. So were the rooms, which were comfortable, and airy, thanks to a grill-less window.

There were two stairways to the ground floor, one led to the reception and the other to the garage. From the building to the gate, there was a narrow path with rich plantation on both sides. Since it was a newly built hotel, the main gate was under construction and the temporary one was made of bamboo sticks. The place was quite far from human habitation, and Arjuna and team were the only guests at the hotel. The hotel looked pleasant during the day, surrounded by trees and vegetation. The nights were very quiet and very dark, the sort that could spook someone used to the bright city lights and static noise. One would wonder why there is such a hotel in the middle of nowhere, but that might indeed have been its selling point.

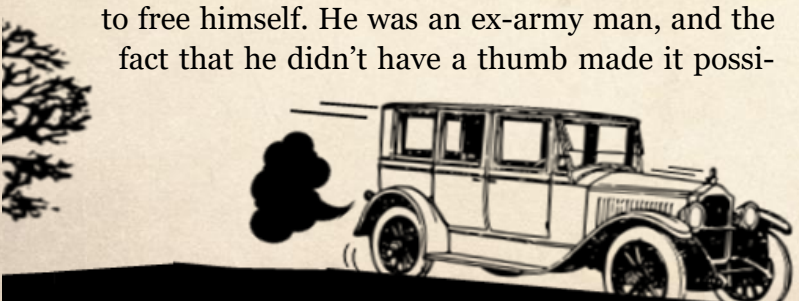
It was a five-day business tour. The first three days went rather well. After having several meetings with wealthy people, they were satisfied with the outcome of the tour. Big investments flowed in during the day, and the team enjoyed quiet evenings at the hotel. Being the only guests, they got chummy with the hotel staff. Day 4 seemed to be headed the same way as the earlier ones. Das babu rubbed his hands together with a happy expression on his face as they walked into the hotel that evening, with Arjuna by his side carrying documents while Bahadur was a couple of steps behind. Das babu and Arjuna were reliving the successful meetings that day. They found the whole hotel crew around the reception area and said "hello" to them. They were headed to the stairs, when the manager called out.. "Das babu, I'd like to ask you something." Mr. Das



walked back towards the manager , while Arjuna and Bahadur turned on the spot and stopped. “Manager sahib, what’s on your mind?” , asked Das babu, expecting an opportunity to dole out some advice to thisrelatively young chap. The manager nonchalantly pointed a gun at Das babu and simply said, “where is the money?” The guests were stunned. “We know why you are here, and we also know, from our network in this area, the sums of money you are dealing with. Give us the money, and we’ll spare your lives.”

It was December, and the weather was cold, but Mr. Das was sweating in deep fear and anxiety. Until a minute ago, he was happy, busy with business deals, thinking about next meetings. Now all that seemed a faraway thought. With the gun pointing at him, everything suddenly changed. His face betrayed the shock he felt. Perhaps in such a situation, it is only natural to think that attachment to earthly things, including money, are nothing compared to the wish to stay alive. He wordlessly turned to Bahadur and Arjuna, who, though surprised, were not wearing any expression on their faces. They both saw that their paths to the staircase and outside were blocked by others. Arjuna judged that his boss was tongue-tied, and said, “we don’t carry any cash with us. We can only give you money when we reach our office.” Obviously, it was not the answer the manager wanted to hear. He became angry and looked positively menacing when he said tersely, “you’ll see what we do to you until we get the money.” With a signal from the manager, the others came up with wet handkerchiefs and put them on the faces of the three. Chloroform. The three lost consciousness immediately.

When Arjuna woke up, he found himself in a dark room. All three were tied to the pillars of the room with their hands at the back. Moonlight was coming in through the window. When his eyes adjusted to the light, he saw that he was still in the hotel, in a room on the 1st floor. In fact, his and Bahadur’s room. It was 3 am in the digital watch on Bahadur’s hand as it gave the hourly alarm tone. By the quietness, it appeared no one else was in the room. Bahadur was already trying to free himself. He was an ex-army man, and the fact that he didn’t have a thumb made it possible for him to try to slide his hand out of the rope. Das babu was watching him, a hopeful look on his face. Bahadur freed himself soon, and within a couple of minutes he freed the others as well. The door was obviously locked, but since it was a two-storey building, it was not a big deal for the three to jump out of the window. Luckily, they could land in the plants and not make a big noise. Wordlessly, they did just that. Bahadur had found and pocketed the keys to the Gypsy.



“Now what?”, asked Mr. Das in a hushed voice. Arjuna said, “if we now start the Gypsy, everyone will wake up, and before we leave this place, they will catch us and that will be worst thing to happen.” “What do we then do, Arjuna?”, asked Bahadur. Arjuna had already made a plan and he started to dictate. “Bahadur, Das babu, listen to me carefully. To be able to escape, we’ve got this one chance tonight. You have to follow my instructions exactly without making any mistakes. I will go upstairs from garage and latch the doors of the rooms where the manager and staff are sleeping. You two will be sitting in the car ready to drive with one door opened for me. Das babu, you will keep a spanner from the toolbox in your hand. The kitchen door cannot be latched, so if the chef wakes up and attacks to you, you must use it as hard as you can. I will be back within a couple of minutes. If we stick to the plan, we stand a chance.”

Arjuna went upstairs as cautiously as he could while other two took the seats in the Gypsy taking care not to make noise. Luckily, it was parked with the front facing the gate. They left the right-hand side door opened for Arjuna. Bahadur started the Gypsy as he sensed Arjuna running down towards the garage. The sound of the engine woke up the chef. He shouted out to his friends as he ran towards the Gypsy with a knife in his hand. Das babu was holding the spanner, shaking and breathing heavily, mustering the courage to strike. But it was not needed, because Arjuna jumped from the stairs upon the chef and pushed him to the ground. Within seconds, he gave the chef a few punches on his face pinning the knife holding arm with his leg. With the chef temporarily incapacitated, Arjuna ran to the car.

“DRIVE”, Arjuna shouted to Bahadur. He accelerated hard and drove as if a fastened angry bull had just been untied. They could see already

that the lights in the rooms were turned on and all of them were trying to open the doors, banging them hard and shouting loud. But those sounds were drowned out by the noise of the main gate breaking. So lucky for them, it was made of bamboo, and they were in a tough vehicle like Gypsy. Bahadur broke the gate with such force that it flew for a few seconds before it landed. But they were clear of the hotel by that time. Arjuna could see the speedometer reading 130 kmph. In fear of a chase, Bahadur drove the car like this for 3 hours and now they were out of the danger zone. Thankfully, due to the absence of mobile phones or the internet like the modern day, and in spite of the hotel's telephone, it seemed that the kidnappers were unable to relay a message to any friends to stop the trio. Later in the morning, they stopped for breakfast, still ever watchful and wary of passing cars. Bahadur, with a cigarette in his hand, said, "*Uff*, what a horrendous experience!"

Art by Ankita Das

A Têtê-à-Têtê with Dr. Debasis Das

Interviewers: Rekha P. T. and Md Kausar Raza

Let's start at the very beginning. Tell us about your childhood and school years.

I grew up in a village which is about 60km from Kolkata and attended a nearby school. I was always fascinated by science. Although now I do research in biological sciences, at that time I was not much into life sciences. The physical sciences branch which consists of physics and chemistry fascinated me, especially how compounds are formed and how they react with each other.

Did you have a role model early on?

I had a teacher at school who unfortunately passed away at a young age. In addition to school, I used to go to him for private tuitions as well. He taught me that the correct way to learn chemistry is to understand the concept rather than memorising the books.

Why did you opt for basic sciences over professional courses?

I wanted to learn more. If I had opted for engineering as a career option I would have had to settle for a corporate job very early in my life. I find that very boring and I think that's why people in that sector keep changing jobs quite often. Another factor was that I was not motivated by money. I didn't want to settle for a job just for the money.

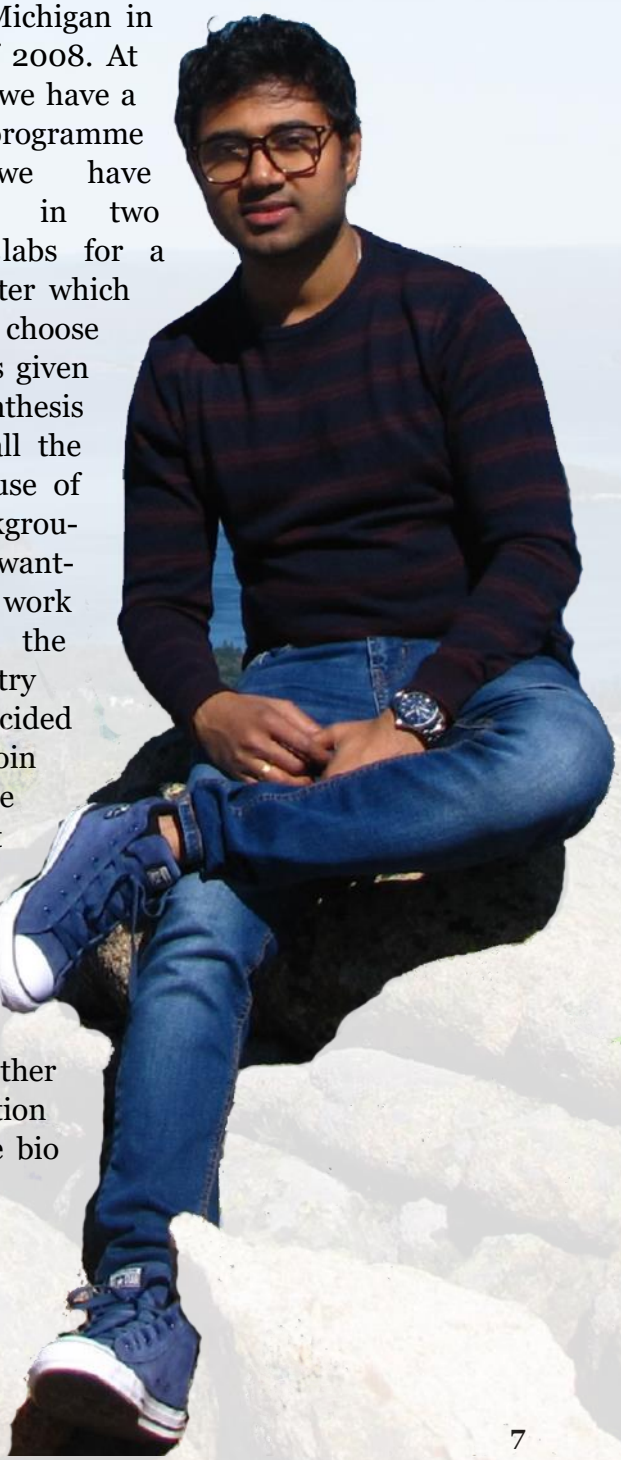
We heard you studied in Ramakrishna Mission, Narendrapur.

Ramakrishna Mission Narendrapur is a very highly reputed college and only the top students go there. I was an average student who scored barely 80% in the secondary exams and so it was a turning point for me to clear the entrance exam and get admission there. It was a residential college and the teaching was very rigorous. Professors really understood the subject and we could go to them anytime to clear doubts. They taught concepts way beyond the prescribed syllabus which enabled us to crack IISc/IIT entrance exams easily.

Why did you choose IISc for your Int. PhD ?

Int. PhD programme at IISc included a year of research along with Masters and thus was a clear choice for me. I also felt it was quicker as compared to doing an independent masters and PhD degree. IISc also provided ample fellowship which took care of everything as opposed to IITs which didn't provide any. It is difficult to come to IISc and not fall in love with the campus.

You moved to the University of Michigan for your PhD. How did it work out there?



I joined Michigan in the fall of 2008. At Michigan we have a rotation programme where we have to work in two different labs for a year after which we can choose one. I was given mostly synthesis work in all the labs because of my background, but I wanted to work more in the biochemistry field. I decided not to join any of the groups at the end of the year and decided to do another short rotation with some bio groups.

I also took some biochemistry courses which piqued my interest in enzymes. I joined Neil Marsh's lab and the work there fascinated me.

How different did you find your life at Michigan as compared to IISc?

At Michigan a project can go on for 10 years and it can be very challenging. For the project to yield any result it takes at least 2-3 years. The focus is more on training rather than on publishing papers and from day one you will be trained to use all the facilities like NMR, Mass, etc. and become an independent operator. They also put a lot of emphasis on collaborations and hence people from all sorts of academic backgrounds were part of the same group which made sharing of knowledge easy. On the personal front, life was difficult initially as I had to deal with an entirely different culture and extreme cold. Cooking food on my own was also a challenge! But Michigan campus is very beautiful and peaceful. Life became easier after a semester.

I feel that I have come home.
I have always felt at home at IISc.

Post-Doctoral experience at MIT?

When you become a post-doc you are no more a student, they treat you like an employee. Life at MIT was entirely different from my time in Michigan. At MIT, they believe that pressure can make you a diamond. So you have to be on your toes all the time. There were continuous research discussions with supervisor and lab mates. It was a rigorous approach to research and I learnt a lot there. My guide Barbara Imperiali was a very supportive person and she gave me multiple projects to work on simultaneously. The projects were all very challenging and there was not much guarantee that any of them would click. The lab was extremely organised and systematic and we had to write a periodic progress report in a particular format. I learnt how to run a lab from there.

Advice to students who are planning to go for post-doc?

Find a lab that is not so big that you won't have a space for yourself and not too small that will suffocate you and an advisor who is supportive. Another important thing is that you have to be open minded and should not be looking to do similar research as what you have done in your PhD. You should expand your horizons and be willing to learn new things.

How did you handle the pressure throughout your student life from school to MIT?

You have to be self-confident and not let other people decide your limits. Wherever you go, work hard to make your own identity and try to stand out so that people can trust you and rely on you.

Life has now come full circle for you now, and you're back in IISc.

I have received unimaginable support from everybody in this department. IPC is a versatile department and everybody here including the Chairman and the Divisional Chairman have been very kind to give me the freedom to approach them anytime for help. A special thanks to my mentor and my former advisor Prof. Mugesh for his enormous and continuous support. I feel that I have come home. I have always felt at home at IISc.

So what do you do when you're not doing research?

I love watching movies and also working out because staying fit is important since we are sitting in front of the computer for a major portion of our day. I go out to movie theatres and enjoy both Bollywood and Hollywood movies. I mostly enjoy sci-fi movies and my favourite movies are Gravity and Interstellar.

What's the most adventurous thing you've done?

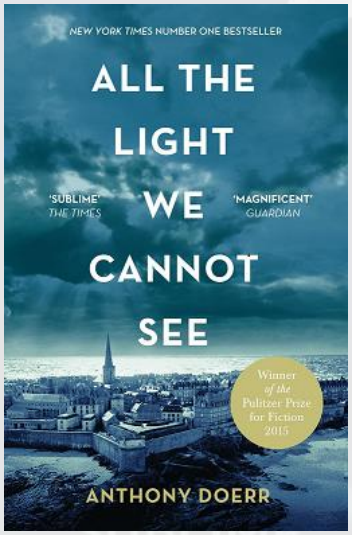
I am not so much into adventurous things. But I once gathered the courage to ride one of the world's tallest roller-coasters.

Any super-enchanting places you have visited?

One was Acadia National Park, Maine, USA. It was at the top of the Cadillac mountain. (Ed – that's the one in the photo.) Other one was Yosemite National Park, California. The scenic beauty of those places blew my mind.

BOOK REVIEW

Gopika Krishnan gives her thoughts on *All The Light We Cannot See* by Anthony Doerr.



"Open your eyes and see what you can with them, before they close for ever." One of the best reads I have had recently, *All the Light We Cannot See*, the Pulitzer prize-winning work of Anthony Doerr, is a heart-touching story of a young girl, blind since she was six, and a teenage boy whose paths cross in German-occupied France, nearing the end of the Second World War.

Marie-Laure is a curious girl living with her father in Paris. Her father is a locksmith at the Natural History Museum. She develops a keen interest in marine organisms due to her constant interaction with scientists of the museum. When she loses eyesight, her patient father builds a miniature model of their neighbourhood , urges that she memorizes it and finds her way on her own. Their idyllic life gets disrupted when the German army occupies Paris, and Marie is forced to flee with her father. They ultimately reach St. Malo, a walled island city, to live with her agoraphobic great-uncle.

In parallel runs the story of Werner Pfennig, an inquisitive German boy who has a way with radios. He lives in an orphanage with his little sister Jutta in an impoverished part of Germany. He manages to lay his hands on an old short wave radio and repairs it. Each night the kids eagerly listen to the broadcast of a mysterious Frenchman talking about science, as he says, "What do we call visible light? We call it colour. But really, children, mathematically all of light is invisible." Werner's aptitude lands him in a technical school under Hitler Youth. Given no choice, he ends up in the war front as a radio technician, intercepting illegal transmissions.

The third thread is of a Nazi sergeant seeking a lost diamond, initially for the government, and later for his selfish motive. Beginning from different points, the story brings these three people together under the same roof. The book gives intricate descriptive of how war affects the lives of the young protagonists. Reactions of the characters were mostly relatable, although there were certain instances where the story felt almost surreal. A sense of kindness and hope pervades all through the book, interspersed with horrors of the war.

Doerr dabbles in multiple realms: science, literature, art, each playing an indispensable role in taking the story forward. He writes about radios, electromagnetic waves, machine guns, insects, molluscs, birds, trees, books, and music. It has little puzzles that the father builds for his daughter on her birthday. This interesting melange is what makes the work stand apart from the multitude of novels set in WW-II.

The story is arranged into concise chapters, adeptly going back and forth in time, alternating between different narratives, which finally coalesce to a common point. Building the suspense page after page, the book had me hooked on until the end. Doerr's elegant writing, his vivid use of imagery is impressive. The story depends heavily on imagery other than visual: Marie experiences the world with its smells, sounds, and touch. She orients herself by counting steps, identifying familiar smells. The story appeals to all senses, making the reading experience even more gratifying. More than the plot of the story, the lucid, wonderfully written prose made the book attractive to me. It will not be wrong to say that Doerr has painted pictures using words in this work.

The portraits of a blind girl trotting through the streets of Paris with her loving father by her side saying, "You can do it, ma chérie!", and the boy listening to Claire de Lune with his little sister on an old radio stealthily at night, lingers in mind long after the last page of the book. This precisely persuaded me to write a review. In praise of the novel, it was aptly said, "... Doerr's novel is one you savour, and ponder, happily lose sleep over, then go around urging all your friends to read —*now*."

BOOK REVIEW

Sharon P. Gnanasekar muses on *'Rosalind Franklin: The Dark Lady of DNA'* by *Brenda Maddox.*

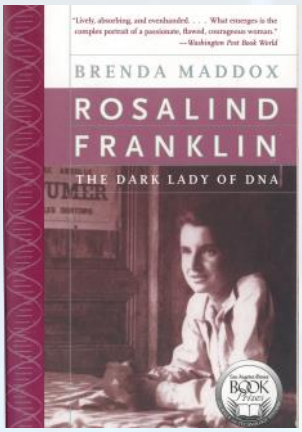
It would be more appropriate to say that these are my half-baked thoughts on the biography, having gotten through only two-thirds of the book up till now. The book chronicles the life of Rosalind Franklin and one of the greatest discoveries in science. It is divided into three parts. The first part deals with Franklin's early life as a hockey-loving schoolgirl, her PhD work on the structure of coals, and her postdoctoral research in France. The second part deals with her work on the structure of DNA. The third, with her work on viruses and her untimely death.

The second part of the book narrates the nail-biting race to solve the structure of DNA. One is well aware of the outcome of what can be thought of as the biggest discovery in biology, yet this part is as exciting as a whodunnit. James Watson's account of this journey has been documented in the famous 'The Double Helix'. However, his book has been criticized for his disagreeable portrayal of Franklin amongst other things. Brenda Maddox's narrative does justice to our overlooked heroine who was very close to solving the structure of the DNA. One is left wondering if Watson and Crick would have arrived at their iconic double helix structure of DNA without Rosalind's beautiful 'photo 51' (that they obtained by unscrupulous means).

The book points out the difference between art and science. "If Beethoven had not written his Ninth Symphony, no one else would have done it. In contrast, if Watson and Crick had not discovered the double helix of DNA, others would have found it, and probably not long after." There are many lessons one can learn from this biography. I would like to point out a few.

Linus Pauling was the expert in the race to solve DNA, with his work on the secondary structure of proteins. However, his attempt at solving the structure was rushed and he ended up making a silly mistake. His proposed structure of the nucleic acids was not an acid – the phosphates were not ionized. Even experts can make mistakes and an important lesson one learns is to be careful before publishing and not to do things in a hurry.

Rosalind Franklin was meticulous and collected her data carefully; it might have been difficult to solve the structure without her X-Ray diffraction photographs of DNA. However, she strongly believed that the structure would be clear once she solved the diffraction patterns and did not want to resort to building plausible models that might have gotten her to the solution faster. As the book states, "Rosalind reasoned: 'How will a model show which structure is right? The patterns will tell us about the structure.'" There are often different methods to get to the answer and one must be open to different ideas even if it makes one uncomfortable.



James Watson had trouble building the model. The bases didn't fit together into a double helix. Watching him fumble, Jerry Donohue (a former student of Pauling) suggested he use the keto form instead of the enol form for the bases. Watson could then easily stack his base pairs to form the rungs of the ladder structure. Sometimes we need to see the problem from a different perspective. Donohue was a chemist; he knew that the bases could exist in both keto and enol forms. Sometimes a problem could be easily solved with a little help of seeing it from a different angle. Clues could be found in unlikely places and we must keep our eyes open for them.

Rosalind missed out on a much deserved Nobel Prize, since the prize is not awarded posthumously. Watson's portrayal of her in 'The Double Helix' was sexist, while her friend Anne Sayre's account in 'Rosalind Franklin and DNA' reduced her to a feminist icon, which she probably was not. Maddox's biography is objective and offers a glimpse of the strong personality that Franklin was.

This piece of writing is inadequate to express the brilliance of Rosalind Franklin or the poignant account of her life and work, that is, Brenda Maddox's book, which probably lets Franklin give a fitting reply to Watson's portrayal of her in 'The Double Helix'. Her legacy lives on, with the recent Mars rover of the European and Russian space agencies, being named after her.

Antibiotic

Kritika Khulbe

I was the sparkle of your eyes
When I was first discover'd,
Swept away generations of bacteria
Even a Nobel Prize was awarded.

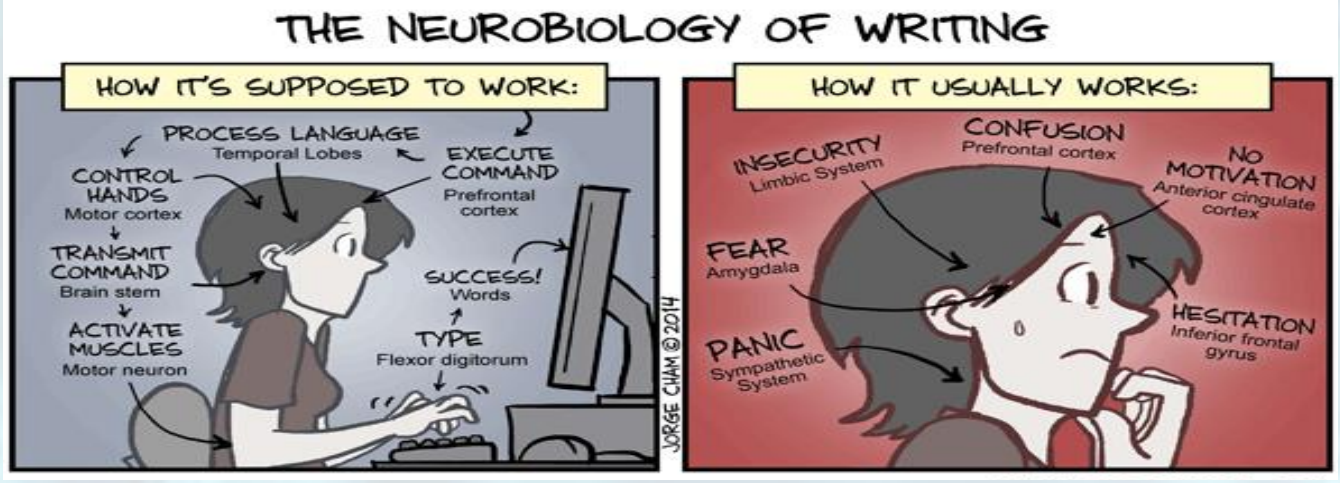
I broke the cell wall
Peptidoglycan on my sight,
Whenever bacteria saw me
Their cytoplasms took a flight.

Alas! came the fateful day
My carboxylamide bond was pinched.
The crafty bacteria had their way
A measly β-lactamase was all they needed.

And now, you call me a traitor
But a friend always I was.
You had a bit over-used me.
Bacterial resistance? Nope, not in my clause!

Still you try to modify me
By attaching groups here and there,
Hope you'll be a little cautious too
While using me for health care.

Have faith in your chemistry
I will surely show effect.
Oh, to swipe-off bacteria again merrily
And make infections a historical fact.



SARASWATI'S DAUGHTERS

The Elixir celebrates a few stellar women scientists from India and abroad via a quiz. Can you identify them with the clues given?

1) She was the Austrian-Swedish physicist who discovered the nuclear fission process with two other scientists. She was wrongly referred to as the 'mother of the atom bomb' after WWII, though she had no role in it. Despite being nominated for the Nobel prize in Physics and Chemistry for several years, she was never awarded one. This 'Nobel' mistake was partly rectified when she received many other honours including the naming of chemical element in the periodic table.

2) A woman of many firsts- she became the first, and till date the only woman, and the first Iranian to be honoured with the most prestigious award in the field of mathematics, for her work on the dynamics and geometry of Reimann surfaces. She was also the first woman to participate in the Iranian math Olympiad and ace it with a perfect score. In 2004, she was acknowledged as one of the top 10 youngest minds who have pushed their fields in innovative directions.

3) Initially rejected admission on the grounds that she was a woman, her persistence made her the first female student of IISc. She was awarded an M.Sc degree in 1936. She went on to become an eminent biochemist in India, and the Director of Royal Institute of Science, Bombay. She was awarded the Rashtrapati award for her work on the health benefits of a drink obtained from palm trees.

4) One of the first women in her country (Canada) to receive medical doctorate degree, she had to move to other countries as women were not allowed to do research in hers. Her seminal work on the rate of enzyme catalysed reaction associated her with a famous equation in biochemistry. She is also credited for having conducted the first protein separation by electrophoresis.

5) This German lady was among the leading mathematicians of her time. She developed several theories in abstract algebra. She is well known to physicists due to an eponymous theorem that explains the connection between symmetry and conservation laws. A crater on the moon is named after her.

6) A German-born American theoretical physicist, she developed a mathematical model for the structure of nuclear shells, which explained why certain numbers of nucleons in an atomic nucleus result in particularly stable configurations. During World War II, she worked for the Manhattan Project. She was also the second woman recipient of Nobel Prize in Physics.

7) She was the first woman to win the Shanti Swarup Bhatnagar Award in Chemical Sciences. A noted organic chemist of her time, she opened the world's eyes to the power of medicinal plants. Her work resulted in several anti-convulsive, anti-malarial, and chemotherapy drugs. She spent around forty years researching various alkaloids.

8) A British chemist, she advanced the technique of X-ray crystallography to determine the three-dimensional structures of protein molecules, for which she won the Nobel Prize in Chemistry. Her most influential works include solving the structure of penicillin (1945), vitamin B12 (1948) and insulin (1969).

9) She was an American biochemist and pharmacologist. In 1950, she developed the anti-cancer drugs thioguanine and mercaptopurine. She shared the 1988 Nobel Prize in Physiology or Medicine with two others for their use of innovative methods of rational drug design rather than trial and error. She never obtained an official PhD degree, but was awarded an honourary PhD from New York University in 1989.

10) An English mathematician and writer, she published the first algorithm designed to be carried out by an Analytical Engine. She had a long working relationship with Charles Babbage, who called her 'The Enchantress of Number'. She has a computer language named after her. Her father was a famous English poet.

Answers on Page 41.

Origin of Sandal Soap*

N. Munichandraiah

Soaps, cosmetics, fragrances, detergents, etc., have become essential commodities of modern living. Society changed from the practice of using clay, pumice stone, oil, etc., for cleaning human body during bathing to using soaps long ago. Soaps and detergents safely and easily remove germs, soils and other contaminant, and help us to stay healthy and keep our surroundings pleasant. Making of soaps dates back thousands of years. Mesopotamian civilization (3200 BC) used a concoction of animal fat and tree ash to produce soap. Egyptians were believed to be the first group of people that bathed regularly. The soap recipe was found on Ebers-Papyrus (1500 BC) which was a medical document.[1] It was used to treat skin diseases and personal cleaning. The chemical process of making soap is now known as saponification. Long chain fatty acids generally exist as triglycerides, which are esters formed by combination of fatty acids and glycerol. They can be either plant origin (linseed oil, castor oil, coconut oil, etc.,) or animal origin (tallow from cattle and sheep). When triglycerides in fats or oils react (saponification) with an aqueous solution of sodium hydroxide or potassium hydroxide, they are converted into sodium or potassium salts of fatty acids (soap) and glycerol. When dissolved in water for the purpose of cleaning, soap molecules form micelles with non-polar tails orienting towards the grease or dirt particles and polar head outwards, thus removing the dirt with ease. Over a period of time, man had cultivated to enjoy not only the ease of cleaning skin, clothes, etc., by soaps to stay healthy, but also the aroma that keeps emitting afterwards. The Indian Institute of Science, in particular, the Department of General and Applied Chemistry (the present Department of Inorganic and Physical Chemistry) played a key role in developing the famous Mysore Sandal Soap a century ago.

The Institute has its origin from the vision of Mr. Jamsetji Nusserwanji Tata (3 March 1839 – 19 May 1904), who determined to establish a Research Institute of Science in the country and submitted the necessary proposals to the Government of India, and the visionary idea was discussed with Swami Vivekananda (12 January 1863 – 4 July 1902).[2] Prof. William Ramsay (2 October 1852 – 23 July 1916, inventor of noble gases and 1904 Nobel laureate in chemistry, Figure 1(a)) submitted a detailed report on different places in the country and recommended Bangalore as the suitable place for establishment of research university. The establishment of the Indian Institute of Science was approved by the Government in 1909 with Prof. Morris Travers (24 January 1872 – 25 August 1961, Fig. 1(b)), an associate of Sir Ramsay, as the Institute Director.[3] The academic and research activities commenced in the year 1911. The buildings that were constructed at that time include the present Inorganic and Physical Chemistry Department in addition to the other buildings such as the iconic Main Building. The research activities of the Institute started producing results by the year 1914, as it was evident from the inception of the Journal of Indian Institute of Science (JIISc) that year.[4] The journal was probably started by Prof. Travers to document the results of the Institute's research and the first article, which was on boron chemistry, was authored by him and his coworkers. Several researchers, probably Ph.D. students, of chemistry contributed to the first volume of JIISc. Steam distillation of wood of several Indian trees was an important research activity of organic chemistry researchers of the Department of General and Applied Chemistry, which was evident from various publications appeared in JIISc during 1918-1920.[5]

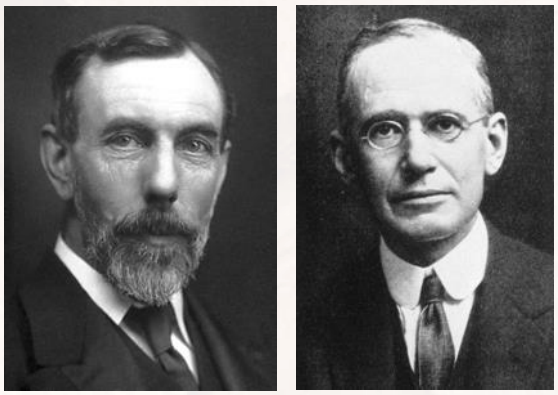


Fig. 1(a) Sir William Ramsay, (b) Prof. Morris Travers

Sandalwood is one of the oldest known per-

* Reproduced from Dream 2047, vol. 22(2), P.25

Fig. 2. A sandalwood sapling on the Institute campus

fumery materials and it has over 2000 years of history. Sandalwood with the botanical name *Santalum* is known to prevail mainly in South Asia and Australia in two broad categories, namely, *Santulum Album* (white sandalwood) and *Petrocarpus Santalinus* (red sandalwood). The dried sandalwood is sweet smelling and it is known as *candan* in sanskrit. Aroma comes from the dry wood, but not from flowers and leaves although they also look beautiful. The perfumery nature of sandalwood is due to the presence of santalol in the wood. The quality of sandalwood oil is determined by the levels of α- and β- santalol, the α- isomer being more abundant than the β- isomer. Typically, sandalwood oil extracted by steam distillation of dry sandalwood contains more than 80% santalol and quality of such oil is considered as good. Sandalwood was originally used at funeral ceremonies, burnt so that the scent could carry the soul into the next stage. In ancient Budhist traditions, it was used as a meditation tool to stimulate sensuality, invoke tranquility, inculcate divine thoughts and promote relaxation. In Ayurveda, sandalwood is used to provide energy and enthusiasm. The sandalwood paste (*srigandh*) is considered as sacred. In India, sandal forests range from Kolhapur to Mysore, Chittoor to Erode, Mettupalyam to Kerala, Mercara to Mangalore and Sagra to Kolhapur. The present green cover of the Institute comprises a large portion of sandalwood trees (Fig. 2). The region around Mysore has been rich with sandalwood plantations. Sandalwood dry logs had a high demand abroad in the beginning of 20th century, which were mainly exported from the princely state of Mysore to Europe. During the period of World War I (28 July 1914 to 11 November 1918), the sandalwood could not be exported and huge quantities of logs remained unused around Mysore.[6] The ruler of Mysore kingdom, Maharaja Krishnaraja Wadiyar IV (4 June 1884 – 3 August 1940, Fig. 3(a)) asked one of his Dewans, Sir M. Visvesvaraya (Sir MV, 15 September 1861 – 12 April 1962, Fig. 3(b)) to find out a method of making use of the logs of sandalwood. Sir MV approached the IISc, which was at its infancy and under development on the land generously donated by the Mysore Maharaja in Bangalore, and sought the help of General and Applied Chemistry Department. Mr. Sosale Garalapury Sastry (November 1899 – 22 Sep 1955, Fig. 3(c)), who was involved in research in the Department, was identified to explore a suitable method of extracting oil from sandalwood. He succeeded in producing sandalwood oil by steam distillation (Fig. 4) and also in preparation of a

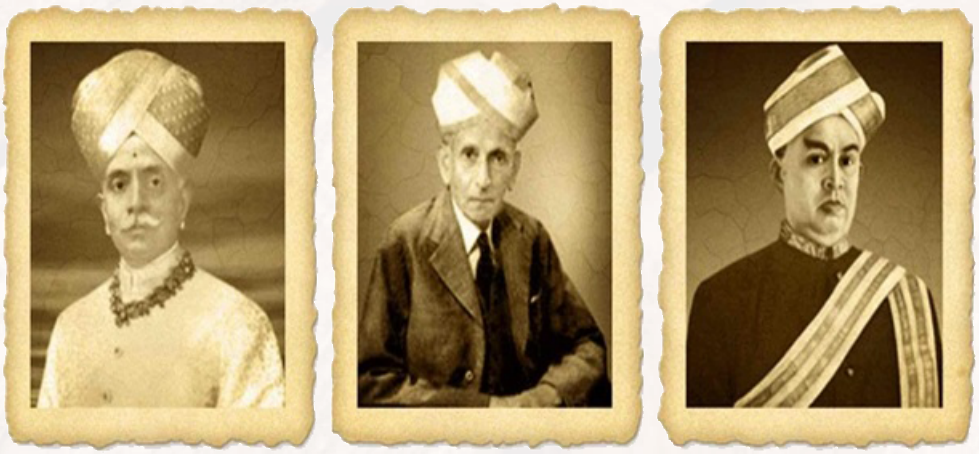


Fig. 3(a) Maharaja Krishnaraja Wodeyar IV, (b) Sir M. Visveswaraya and (c) Mr. Sosale Garalapury Sastry

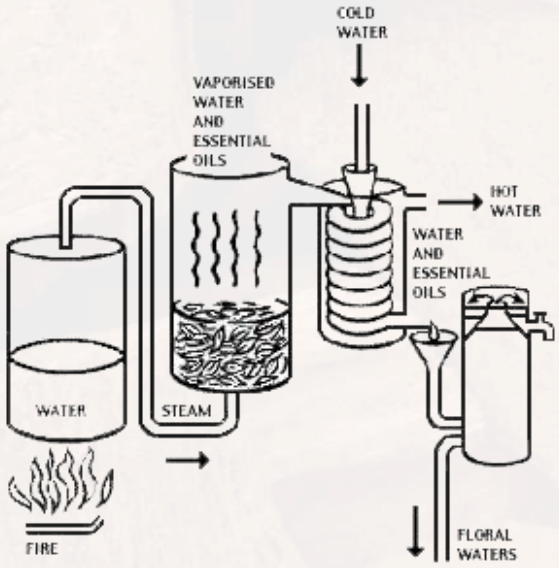


Fig.4. Schematic diagram of steam distillation process

soap employing the sandalwood oil as an essential component. Sir MV presented the soap to the Mysore Maharaja, who was impressed by its fragrance, decided to start a soap manufacturing industry and gave the task of setting up the industry to Sir MV. Mr. Sastry was sent to Bombay and then to UK to gain the technical knowledge of production of soaps in industrial scale. Mysore Soap Factory started its function in Bangalore in the year 1916 and the commercial soap was launched in the market in 1918. Mr. Sastry was responsible in designing the oval shaped Mysore Sandal Soap with *sarabha* as the emblem (Figure 6). *Sarabha*, with lion body and elephant head, combines the virtues of wisdom, courage and strength. The century old emblem and shape of the Mysore Sandal Soap remain the same even today. The Mysore Soap Factory later was expanded and it became Karnataka Soaps and Detergents Limited with a large number of products such as talcum powder, incense sticks, detergents, etc., in addition to soaps employing sandalwood oil. The Bangalore factory is now located close to the Institute. Mr. Sastry became popular during his period and he was affectionately known as Soap Sastry.

Fig.5. Mysore Sandal Soap with *sarabha* as its emblem

In his address at Indian Science Congress held at Lahore in 1918, Prof. G.J. Fowler, professor of biochemistry in the Department of General and Applied Chemistry, stressed the importance of training students in all aspects to comfortably contribute to industries.[7] It was important for educational and research institutions to produce the kind of graduates who could successfully devote themselves to applied chemistry. At that time, the subject of applied chemistry was less attractive as its students laboured under difficulties owing to the absence of industrial centres. There was a need for definite and specific training for those who intended to take placement in industrial developments for which plenty of scope existed during that period. This might be the reason for naming the chemistry department as Department of General and Applied Chemistry. Prof. Fowler further stated that one most important qualification for success in applied chemistry was to possess a technical sense. At the Institute, methods were tried out in a modest way for a limited number of industrial research paths. Prof. Fowler suggested for setting up of a model plant before transferring the know-how to an industry. He stated that sandalwood oil was a source of profit to Mysore and the production of soap was ready in 1918 to get it transferred from the Department of General and Applied Chemistry of Indian Institute of Science to a factory in Bangalore. Thus the Mysore Sandal Soap was one of the first industrial products developed by the Department General and Applied Chemistry (and perhaps by Indian Institute of Science) and the model plant would have been set up in the present building of Department of Inorganic and Physical Chemistry a century ago.

1) https://www.naturesgardencandles.com/mas_assets/theme/ngc/pdf/history1.pdf

2) R.M. Lala, 'For the Love of India: The Life and Time of Jamsetji Tata', Penguin Books India (2004) p. 105

3) M. W. Travers, 'Morris W. Traver, Scientist and Pioneer, An Autobiography, 2016, IISc Press.

4) M. W. Travers, R.C. Ry and N.M. Gupta (1914) J. Ind. Inst. Sci., 1,1.

5) H. E. Watson, J. J. Sudborough and co-workers J. Ind. Inst. Sci., (a) 1918, 2, 79, (b) 1918, 2, 107, and (c) 1920, 3, 281.

6) https://www.thebetterindia.com/117267/history-mysore-sandal-soap-karnataka-wodeyar-visveswaraya-shastry/

7) G. J. Fowler (1918) J. Ind. Inst. Sci., 2, 1

In conversation with Dr. Soumya Singha Roy

Interviewer : Garima Tiwari

Tell us something about your childhood.

I grew up in a remote village in the district of Midnapore, West Bengal and did all my school studies there in Bengali medium government schools. Even though the place was and still is quite isolated from the city glares, we had all the basic facilities as I was growing up. My school life was very enjoyable and rewarding as I was blessed with a wonderful family, friends and teachers around me.

What did you aspire to be as a child?

Well, as a child, nothing in particular. Probably like everyone, my aspirations would change every couple of months from a pilot to a world-traveller to something else. However, by the time I started my higher secondary (11^{th}-12^{th}) education in the Science stream, I aspired to be a Science teacher, especially in Maths.

Your fondest memories from college?

During my college time, there were only two main exams (part 1 and 2) for the 3-year B.Sc. course. Getting a first class was a big achievement at that time and I did not get one at the end of my 2^{nd} year (part 1). But I did exceedingly well in the 3^{rd} year and I not only achieved a first class in Physics but was also one of the rank holders. Whilst I was extremely happy with my results, I also felt sad at the same time as it was the last day of my college life!

You have spent quite some time at different places. Which places have you enjoyed the most?

Quite a few places, actually. I love travelling and exploring. I have always liked remote places close to nature more than any city marvels. As a PhD student, I never missed an opportunity to go for a conference in India and visited many places along the way. Trekking in Vaishno Devi in Jammu was one such great experience. There are also many not-so-well-known places in the Western Ghats that are absolutely gorgeous for visits and trekking, especially during the monsoon. Later, when I moved to the UK for a post-doc, I had the chance to visit many picturesque

places across Europe. Scottish highlands, Danish islands, and Swiss Alps are among my favourites. London would probably remain my favourite mainly because of its extremely rich history and cultural side together with deep-rooted India connections.

What are some of your hobbies?

I grew up in a vibrant cultural atmosphere and participating in arts and music were a must. So, I like music of all kinds and I play Tabla when I get some free time. (*Future Alchemists' may take note. – Ed*) I also have a great fascination for learning new languages, and I think I have a rather good knack at picking them up quickly. Kannada is my next target. Reading old Bengali literature and watching good movies are also among my hobbies.

Not many students get a chance to study at IISc and IPC. Utilize your time well and get ready for the future.

Your favourite dish...

A classic Bengali vegetarian meal.

Favourite subject?

Mathematics was my first favourite subject. But as I got older, I started liking any subjects that dealt with atoms and molecules whether in Physics or Chemistry.

Which subject you dreaded the most?

Luckily, I did not have an aversion to any subject.

Did you always aspire to be a scientist, or did certain incidents in your life paved way to this path?

I think the true sense of becoming a scientist came much later in my life, but I certainly would have been a science teacher if not a scientist per se. There wasn't any eureka moment for me but it was rather a slow progression when I started aspiring to be a scientist.

How do you find IPC and IISc?

There is nothing like IISc. It is truly a very special place. I just love the campus and everything it has to offer. Being a faculty member in the IPC department gives me a great sense of pride and honour because of its illustrious history and contribution to Indian science.

What differences do you see between IPC and other chemistry departments where you have worked?

In terms of research labs, students, members etc. I don't see much difference among the labs that I visited or worked. But the IPC building is very special and has an illustrious history. I hope its architectural beauty will be preserved for the future generations to visit and get inspired.

Tell us something about your mentors during your Ph.D. and Post doc period. How have they influenced you in evolving as an independent researcher?

I was one of the first PhD students of IISER Pune and certainly the first student of my PhD supervisor. I had no seniors or any reference for any matter. I had no other option but to learn everything from scratch and my advisor was great, taking me along the way, establishing a lab, settling down and doing research. On the contrary, both my post-doc labs were very well established and structured. It was expected that research will be done mostly independently by the postdocs with intermittent discussions with the advisors. I think over time, that really helped me to become an independent researcher.

How do you think scientific research in India can be improved?

We are certainly doing better than ever but we need to keep improving at a much faster rate. Administration getting increasingly digital is a great sign.

Share your vision for future?

I think it would be too early for me to answer this. At the moment I am just focussed on establishing my research.

Any message for IPCians.

Not many students get a chance to study at IISc and IPC. Utilize your time well and get ready for the future.

One quality a researcher must have?

Perseverance.

Blissful Rahmania

Sai G. Ramesh

Concinnity. That's a word I heard for the first time a decade ago. It was the name of jazz album[1] I saw an advertisement for. I don't think I heard the album at the time, but the word stayed with me. A dictionary shows its meaning as "skilful and harmonious arrangement of different parts of something." A collection that is more than the sum of its parts, becoming something wondrous and beautiful. Aha! I finally had a word that was apt for A. R. Rahman's music: A concinnity of musical ideas. Some years previously, during my PhD, I'd got deeply hooked to Rahman's music. Marvellous melodies seemed to appear from thin air, masterfully arranged, and completely enveloping my senses! Not just some songs in a soundtrack, but all of them. Nary a day went by without me listening to some song or whole album composed by him. I'd become a Rahmaniac. I think I still am.

You may be wondering if I was unaware of Rahman until my PhD. Come now. Is that even possible growing up in the 90s in India? Of course, I was aware of his music. Everyone and their uncle was talking about it. Even as I was finishing school in the early 90s, my friends and I were discussing how musically excellent *Puthu Vellai Mazhai* / *Yeh Haseen Wadiyaan* from *Roja* is. The song I recall from *Rangeela* before anything else is *Mangta Hai Kya* for its dreamy soundscape. Who was not enchanted by the music, dance, and picturization of *Chikku Bukku Rayile* (*Gentleman*) which showed us the moves of Prabhu Deva and his brother Raju Sundaram. *Chandralekha* from *Thiruda Thiruda* (*Chor Chor*) has a very contemporary sound; bonus points for those who are able to relate this to Michael Jackson's *In The Closet* (*Dangerous*). I rather liked *Raasathi* from the same movie without knowing at the time that it was the first *a capella* style movie song in India. And of course, *Bombay* with its classic *Uyire/Tu Hi Re*, mesmerising theme instrumental, and good picturizations to boot. So I knew about Rahman like everybody else did. But my head was generally elsewhere, listening to western pop, jazz, ghazals. Also, Rahman had made many more Tamil songs than Hindi ones at that point. I wasn't living in Tamil Nadu to hear his songs blaring from speakers on street corners. It all changed during my PhD, since my flatmates for the first couple of years were from Chennai. And perhaps it took that long for me to see what my musical tastes were gravitating towards.

Did a single album lead to my obsession with Rahman? Of course not! It took time, as all good things do. *Lagaan* was then recent, while *Taal* and *Dil Se* we a few years older still. And there were *Kandukondein Kandukondein*, *Kannathil Mutthamittal*, and *Parthale Paravasam* in Tamil. There's that je ne sais quoi about Rahman's music that one gets attracted to (*Hub*) and infatuated with (*Uns*) at first listen.[2] I kept listening to them more and more, first thanks to my Tamil flatmates, and then on my own. I started following the compositions more closely with every listen, memorizing musical phrases, and relishing their appearing and timing in the songs. Somewhere during that process, the mania set in. I suppose I couldn't but call myself a Rahmaniac when I found myself going to an Indian shop (I was in the US) far out in the city with the specific intent of buying the CD of his latest soundtrack, and some other provisions for home on the side. And when I found myself looking on the internet (which was a much quieter

thing those days) for rumours of upcoming albums. And when I was overwhelmed by albums like *Kangalal Kaithi Sei*, *Tehzeeb*, *Meenaxi*, and *Aayitha Ezhuthu/Yuva*. I cared not for the lyrics, which were sometimes good and sometimes banal or just silly. I was lost deeply in the music: *Ishq*, *Aquidat*, and *Ibaadat*[2] all at once. Were they heady times or what!

Mania equates to some level of obsession (*Junoon*). For me, it was not listening to music in a loop. Maybe I listened to a song twice in a row, but I was looking for details, seeing the layered, textured nature of Rahman's music. I would follow the path of different instruments, specific phrasings, a particular embellishment done just right and at the right time. I began to appreciate music production. Have you listened to *Jaan-e-Bahaara* (*Dil Ne Jisa Apna Kahaa*) carefully? There are many small things going on below the main tune, they sparkle for a moment and subside. Or take *Yeh Rishta* (*Meenaxi*). What a pattern-defying tune! Below the vocals, we have the earthy bass, a synth drone, strings, sounds of flowing water, and more vocal flourishes. Consider the gentle flute and rhythmical clacks in the recent *Sindhu Maa* (*Mohenjo Daro*), with a lush bass behind it all. The oud (middle eastern lute) and santoor during the male Urdu vocals and sitar during the female Hindi vocals in *In Lamhon Ke Daaman Mein* (*Jodha-Akbar*) serve as musical cues to the different cultural backgrounds of the protagonists. There's not a thing out of place!

I'm obsessed not just with the music, but the quality of the vocals as well. Songs with up-there-in-the-sky vocal performances are aplenty in Rahman's repertoire, but let me specially mention *Dil Gira Dafatan* (*Delhi 6*) sung by Ash King, *Adiye* (*Kadal*) by Sid Sriram, *Gulfisha* (*Adaa*) by Sunidhi Chauhan and Sonu Nigam, and the impeccable qawwali *Noor-un-ala-noor* (*Meenaxi*) by Murtaza Khan and Kadir Khan, sons of Ustad Ghulam Mustafa Khan. It would then be remiss of me not to mention another protégé of this Ustad, namely Hariharan. Just about anything he has sung for Rahman is wonderful, but let me mention the enchanting *Malargalae* (*Love Birds*; with K. S. Chithra), the perfect and balanced *Ay Hairat-e-aashiqui* (*Guru*; with Alka Yagnik), and exquisite *Udhaya (Udhaya;* with Sadhna Sargam).

And there are Rahman's interludes. Oh, those delectable interludes! They are a chapter on their own, but I'll keep it short. Take *Naetru Illadha Maatram* from *Pudhiya Mugam* (remade as *Kal Nahi Tha* from *Vishwavidhaata*) where there's this beautiful union of flute and veena, first separately and then together; it's hard not to suddenly well up in the last 30 seconds of the song. Hear the wonderful saxophone in *Sabaq Aisa* (*Tehzeeb*), the extended Carnatic-styled ending in *Rehna Tu* (*Delhi 6*) played on a Continuum Fingerboard, the softly played flute-electric guitar combination that fills the space between the vocals in *Oru Deivam Tanda Poove* (*Kannathil Mutthamittal*), the scintillating orchestral in-betweens of *Puttham Pudhu Bhoomi* (*Thiruda Thiruda*). I'll add the santoor that fills *Chanchan* (*Water*), the flute that completes *My Wish Comes True* (*Kisna*), and the guitars that are the only thing accompanying the voice in *Enga Pona Raasa* (*Maryan*).

This brings me to a key Rahmanism. It won't escape an attentive listener that one of his two or three interludes or bridge pieces is particularly brilliant. It would usually, though not exclusively, occur between the last and penultimate verses. And it would often occur about 3 minutes into a song. This was by design, according to the late H. Sridhar, Rahman's longstanding sound engineer.[3] Right when the song starts getting a little repetitive, he goes and adds a mindboggling detour before the song returns to its main track. Don't believe me? Well, listen to *Munbe Vaa* (*Sillendru Oru Kaadhal*) that has this exquisite synthesizer-based piece there to keep your attention from waning. Sheer genius! Or *Tere Bina* from *Guru,* where you'll find a simple yet evocative interlude with strings. Also true for *Jaan-e-Bahaara* that I mentioned earlier. Or *Aaj Dil Gustakh Hai* (*Blue*) where he uses it as a pause in an otherwise punchy song. There's the interlude in *Sheher Mein* (*Rockstar*) that sounds santoor-like. My list is near endless, but you get the drift. And to top it all, sometimes Rahman shifts octave at the ends of songs, as he did recently in *Sindhu Maa* (*Mohenjo Daro*), a decade-and-a-half ago in *Santhippoma* (*Enakku 20 Unakku 18*), and in between in *Jaage Hain* (*Guru*). One doesn't hear this too frequently.

I know, I know! Too much data and analysis. So let me talk of some songs that are bright as a sunny day. They don't need a grating to analyse the spectral components. Those who can

quickly recall *Theekuruvi* (*Kangalal Kaithi Sei*), sung with a beautiful ending bhriga sung by Harini and based on the ragam Hamsadhwani (oops, I analysed again – mea culpa), or the literally exploratory *Yun Hi Chala Chal Rahi (Swades*) with Hariharan's voice coming out of the car radio will know what I'm talking about. These two were my go-to songs if my mind were in a playful mood. And then came along *Masakkali* (*Delhi 6)*. Whoo, boy! I can't begin to tell you how excited this made me, in part because I like the sound of the accordion. And did Rahman take it places or what! To me, this whole album (*Delhi 6*) is a bright happy one, even if some songs are lyrically pensive. There are other albums that create different moods. Like *Jodha-Akbar*, whose sparseness of instrumentation and languid pace is like a gentle caress. Or *Kannathil Mutthamittal* where you feel the pangs of emotion in the music just as much in the lyrics. Or *Rockstar*, where the music begins happy, and goes pensive and gloomy, mirroring the state of the protagonist's mind.

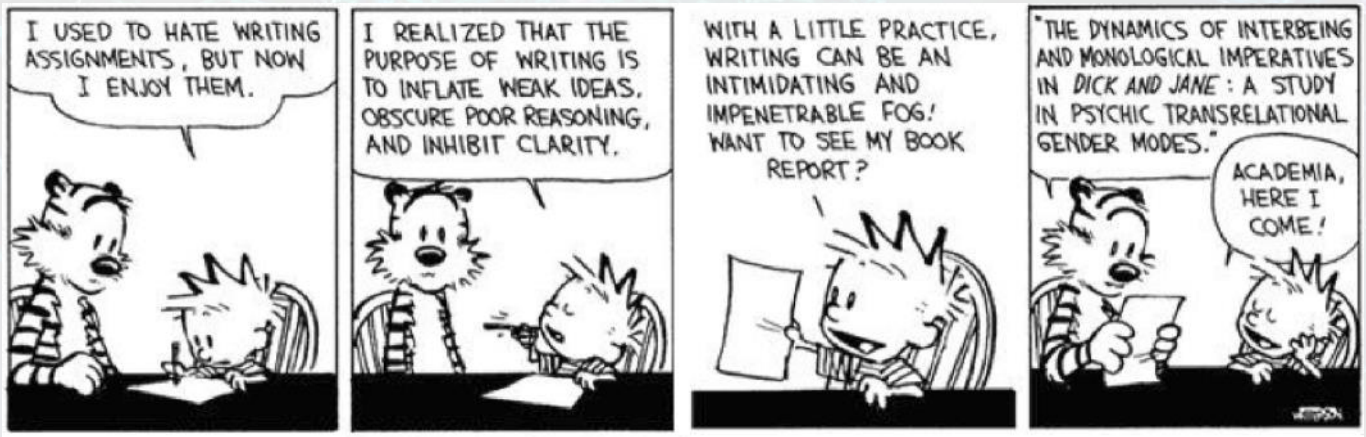
Rahman is not only an creative and technically-skilled composer, but he surrounds himself with excellent and technically sound musicians, singers, sound engineers who are able to take his ideas forward. This has been his key strength. You always see him talking of his team in his interviews. This is something that is now normal, but back in the 1990s and 2000s, it was not too common in India. Rahman's album covers and even his website would specifically contain credits. You would see the names of the excellent flautist Naveen Kumar, will-play-drums-on-anything A. Sivamani, bassist Keith Peters, or various people in the background like H. Sridhar, K. J. Singh and others who took care of the recording, production, and mixing. As scientists, we are used to this, namely giving credit where due. Good thing for musicians, too, bringing them to the limelight.

So I'm a nutter. Yup, for Rahman's music and a few others like Hariharan. I'm so gaga, I could not finish writing this for days because my mind started playing the song I was writing about, and my hands stopped typing or I'd type too much. I used to be able to work and listen to his music, but age has caught up with me and the conjunction has changed to "or." More truthfully, I like to savour his music, as well as all kinds of music I like. So what else can a fan like me do but pay obeisance to Rahman, and simply say to him, "thank you for your music!" So the next time you see me walking in the departmental corridors, seemingly in my own world, I might be thinking of some science, but it's just as likely that my mind is wallowing in blissful music. Frequently, Rahman's.

1)"Concinnity" by the Ulrich Dreschler Cello Quartet (2010)

2) Cryptic clue: *Satrangi Re* from *Dil Se*

3) Interview of H. Sridhar (around 2006-07): https://youtu.be/5dvHwJBqr1k



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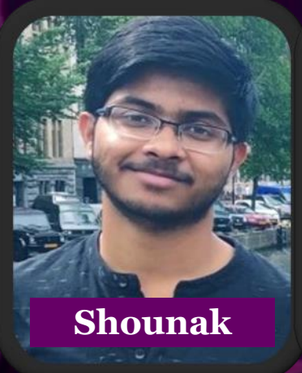
Barnali


Kalpana


Sarthak


Runa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Shivam


Anas


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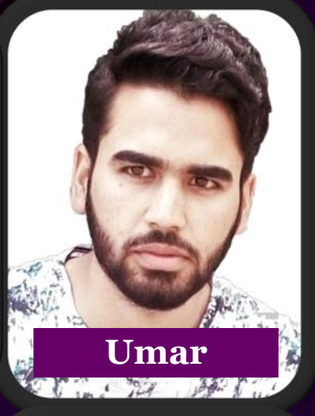
Keerthika


Reshma


Sekhar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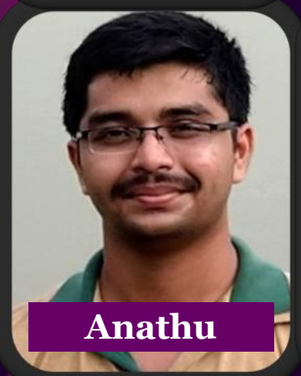
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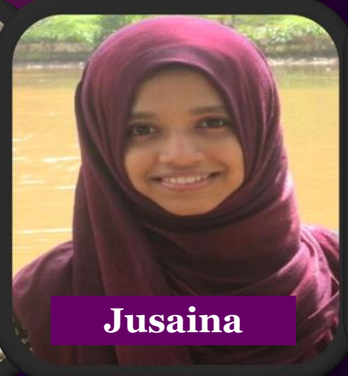
Chesta


Deepak


Sandhya


Jusaina


Tabish


Rinshad


Sumaiya

A Passage to India

Dr. Unathi Sidwaba

The author is a visitor to IPC from the Nanotechnology and Water Sustainability (NanoWS) Research Unit, University of South Africa Florida Science Campus, South Africa.

I will just start by patting myself on the shoulder for a job well-done (choosing IISc for my research visit). During the initiation of my visit, I was told good and bad stories that kind of made me reluctant and skeptical about coming here. As a result, I was happy when things with all involved parties and committees dragged on, adding to the uncertainty of my visit. However, I knew deep down that as an emerging researcher who seeks advice and mentorship towards student supervision, I had to make a decision. I also want to thank my South African mentor, Prof. Thabo Nkambule who gave me a little push with a threatening message that read: "Make sure you land in India on 1 July as was planned."

Indeed, I landed in Bangalore on Monday, 01 July and reached IISc around 11 am. After a long flight, I was ready for a very long nap which I didn't get. Instead, I received a call to get ready for introduction to my hosting advisor's lab, Prof. Srinivasan Sampath. I knew for sure, at that moment, that I was really out of my comfort zone. The first few weeks were not easy at all, with difficulties in adjusting to the time difference, the high temperatures and the walking distance (from Centenary Visitors' House to the IPC Department) that made my feet swell everyday. While walking to and from the lab, I wondered to myself (with little knowledge though) why the institute had to be in the 'bush' (*See picture! - Ed*). The wondering faded when I saw some notes on some areas being 'research areas' while some trees have labels on them. After a few weeks, I managed to use the e-rickshaw services (Transvahan) and it was quite an experience as I have never used the kind of vehicle before. At first, I was challenged by the color codes for the routes (green, purple, blue, etc.) and differentiating between the Transvahan itself and the UberAuto, but thanks to the friendly drivers who told me to only use the green and purple lines because I would just shout 'CVH' (my destination) whenever I saw one of the vehicles.

Picture Courtesy: Chirantak Pramanik

As much as I know lizards and monkeys, having to deal with them personally was a nightmare. I even lost my flip-flop as it broke while fighting and killing a lizard that I found in my room. With almost six months that I have been here, the lizards still scare me to death. But fighting the lizards every day after getting to my room is nothing when compared to the monkeys roaming around the CVH and trying to open doors and windows. I used to take pictures of the monkeys as they 'seemed so innocent and harmless' until one day. On the day, I had just left the room for the lab when I bumped into a troop of monkeys within the guest house. When one monkey came towards me, I lost it and screamed for help. Yooh, I thought they were going to kill me as they all came closer and screamed! With my eyes closed while screaming, I was only waiting for their bites. I was rescued by my neighbour who drove them away with an umbrella. From that day on, I pass the monkeys at the speed of light.

Contrary to the Indian dishes I had tasted in South Africa (from the restaurant Passage to India), the spices here are too much for me. Anyway, I guess it is because we notified them (the chefs) to use less spices when preparing the food. I did the same thing here, ordering the breakfast egg omelet without spices and so on. It is true that little knowledge is dangerous. I would see other guests

always taking soup first, before their meals. Every time I looked at the soup, I saw it 'watery and not appetizing for my liking'. After hearing about the importance of the soup, I took it everyday (hoping it would boost my metabolism in such a way that would make me lose some weight). Nonetheless, when the food was too spicy, curd was my rescuer. I would take a spoon of the spicy food, followed by two spoons of curd and I would be sorted spice-wise. Thinking that I was clever, I decided to buy noodles to cook for myself. Unknowingly, I used the whole spice sachet as per noodle bundle and the spices caught me, with no curd in my room to rescue me. I should mention that during dinner, the 'small' meat portions of only chicken (no pork, no mutton) starved me to a point that I even thought of being a vegetarian until I tasted Truffles and other meaty dishes (that I now harass by visiting every day for the meat; I can't help it, I am a meat person). When it comes to desserts, everywhere I go, they are superb, especially those with coconut! Having mentioned that, I was surprised though that we can only drink the juice and not the white meaty part that I love most in the coconut.

In comparison to my country, traffic is quite different and is heavier here. Despite the traffic that scared me, when I took an evening walk along New BEL Road, it seems like almost everyone owns a motorbike, or a two-wheeler as it is called here. I must say, I enjoyed riding the motorbike for the first time in my life and although I tried to remain as calm as someone who is used to it, I couldn't help my mind from wondering about what I would say should we get involved in an accident. This was only because a motorbike accident took the life of one of my favorite radio presenters. But things are different here, which is what may have made me calm. I was also not very convinced when I was told that it is safe here for people to walk freely any time of the day. I then decided to walk and do shopping along the New BEL Road (in late evenings) and I must say, it is a very safe place.

The system here is totally different, too. In the first few weeks, I was told that Saturday is a lab-cleaning day and I would leave the lab immediately after cleaning. I realized though that the parking area in front of the department was fully packed as during the week while I would see almost all department academics. I was not very sure though until our group (Prof. Sampath) held a group meeting on a Saturday. Even on public holidays, as I wasn't aware of

such days, everyone would be in the department doing their work. This is quite impressive and interesting. Besides attending the seminars, it was an honor to attend the felicitation of Prof. S. Vasudevan and both Freshers' Day and the Teachers' Day.

Lastly, I took a tour around Bangalore, alone, seeing it would be necessary as I will be travelling and doing things all by myself as an academic. I did not worry much about the people I would be touring with rather than communication. After the Uber driver dropped me and told me to enter a security gate around ISKCON Temple, all the people I asked knew nothing about a tour minibus. To make things easy, I would just give the phone to any person I came across, to tell the tour guide my exact location and this is what I did until I got back to the IISc in the evening. Other than seeing the beautiful Bangalore and meeting its friendly people, I was astonished by the hospitality I received from two related families; Ashokan and Rajeev families. In South Africa, especially Cape Town where I am based, you would think twice before helping a stranger, even in broad daylight due to the high crime rates. So the least I could do is acknowledge the humanity and care shown to me by Ashokan, Renji Ashokan, Anusree Rajeev, Ard ra Rajeev, Aradhana A. Nambiar, Abhay A. Nambiar and Edayath Rajeev.

A tournament that should never have been played

Hariprasad K.M.

A decade and half of Brazilian dominance on the World Cup must have been tough to take for Argentina. Never having won on the big stage, "La Albiceleste" had to watch enviously, as the Pele-led side won 3 out of 4 world cups between 1958 & 1970. But their time would come: it would begin not with the arrival of Diego Maradona, but with the first tournament they hosted.

Unfortunately, the controversy which it was mired in was of a much more serious variety than Diego's "Hand of God" goal in Mexico '86. As David Winner[1] wrote in *The Financial Times* in 2008, "The more one knows about the 1978 World Cup in Argentina, the more obvious it becomes: the tournament should never have been played." The reasons behind the controversy are politics and human-rights violation of the ugliest kind.

Picture credit : fifa.com

The military coup in 1976 brought a new administration to power known as National Reorganization Process. Its leader General Jorge Rafael Videla, who presented the trophy to his country at the end of the tournament, had said couple of years earlier, "As many people as necessary must die in Argentina so that the country will again be secure". It was a vicious regime. Thousands of Argentinians died at their hands. Torture and 'disappearance' were rife. To them, the World Cup was a potent political tool.[2,8] Argentinian poet Jorge Luis Borges quoted 1978 WC as a " natural calamity" even before it happened.

It was pure barbarism unleashed, as the military, led by Videla, imposed power on the people, imprisoned political opponents and people who raised their voice. They killed children of their adversaries in close quarters and didn't even allow them to be buried, but carried the dead and alive alike in airplanes and threw them into the sea. They broke human dignity to the bones. It is supposed that at least 30,000 people disappeared, mostly young political activists, human right activists, Jews: in general, the people who questioned the coup.[2-3]

David Winner again[1]: "In the words of Argentine journalist Ezequel Fernandez Moores: *1978 World Cup was the most obvious political manipulation suffered by sport since the Olympic games of 1936 in Nazi* murder also organized the World Cup". To hide these violations above international press and community, they manipulated the tournament to get the result they wanted-to have Argentina crowned as the world champions.

Visually, 1978 World Cup was universally appealing. It hid the dark realm behind the veils of celebration and euphoria. Argentina, on the road to being crowned the champions, benefitted from abused refereeing, a partisan crowd and military junta. Some believe that the Argentine euphoria following this triumph extended the life of the dictatorship by several years.

Claims about specifically rigged matches have persisted. Argentina needed to beat Peru by a clear 4 goal margin to progress through the second round. In 2012, former Peruvian senator Genaro Ledesma said that Peru had sent its 13 leftist political prisoners to Argentina "in order to disappear them" and to help Argentina rebrand itself by winning the most important trophy in world sport. And the deal was sealed with an offer the Argentine junta just couldn't refuse. Peru offered to return the favour by losing their World Cup game with Argentina by a large score. Argentina won the game by 6-0.[8]

In John Spurling's book[7]: *Death or Glory; the Dark History of the World Cup*, he quotes Argentine striker Leopoldo Luque who said he was given a warning by the regime followed by the narrow win over Hungary in their opening game, with France and Italy still to play. He was told that "this could become a group of death as far as you are concerned." Against France, there were allegations of corrupt refereeing. An unnamed French player was quoted by Spurling as having heard the referee say to Daniel Passarella following a foul on French winger Didier Six: "Don't do that again please, or I might have to actually give it next time." Spurling also cites a caller to a French phone in 2003 who muffled his voice and alleged that Argentine players were so

* Edited from the author's blog.

Picture credit : Associated Press

high on amphetamines that "you could hear them screaming in their dressing room and they had to warm down for 2 hours after the match." Football appears almost an afterthought after all of that.

In the end, Argentina's regime got what they wanted, and their side lifted the trophy. The Netherlands suffered second successive defeat in WC final, after losing 2-1 to West Germany in 1974: this time they had to cope without Johan Cruyff who had chosen not to attend. For a long time, Johan Cruyff's absence was thought to be due to political reasons. But he ended years of speculation in a 2008 interview with Catalunya Radio, saying that he had been shaken by a kidnapping attempt on his family. It is yet another ugly chapter in the story that is 1978 WC.[5]

Due to the amount of money being rolled out, no nation can boycott the modern World Cup, even if it has a political disagreement to a certain extent. The only player who boycotted 1978 game was the German defensive midfielder Paul Breitner, a legendary cult figure in German, Bayern and Real Madrid history, who was a staunch advocate of left-wing politics. A lot of teams refused to participate in the insipid World Cup of 1950 in Brazil after the Second World War, due to the Cold War and associated political show business. Argentina boycotted it due to existing tensions between Brazil and Argentine football confederations. The 1980 Moscow game was boycotted by the USA and the 1986 LA game was boycotted by the USSR. But all these boycotts unfolded as a cascade effect of bigger political tensions following the Cold war. But the sole reason to boycott 1978 World Cup was based on the humanitarian grounds, which no one did. In his blog, Jonathon Stevenson[8] from BBC, had written that the Netherlands almost boycotted the tournament, but eventually, they went ahead as their team was strong enough to lift the World Cup even in the absence of Cruyff. It leaves a question pointing to global politics: is humanitarian grounds a less potent motivator for responding to a crisis or is it one's differential perception of the right wing and left-wing governance?

In fear that the world might come to know of the gross humanitarian violations of 1978 WC, the junta killed the World Cup organizer even before the first kick happened. Terrors were so real that the ground staff chose to protest against tyranny and remember the ones who "disappeared", by deciding that the goalposts would be the public bearer of black armband. But first, they had to present the idea to the generals. "They asked what the black bands were for. We told them it was a tradition. They were clueless about football," the 1978 World Cup groundsman Ezequiel Valentini told *The Guardian* in an article in 2017.[6]

Argentina got a more honourable victory in Mexico '86 by the genius of Maradona, but this one must surely be considered tarnished. Mario Kempes finished as top scorer with 6 goals and Brazil finished 3rd, but it is hard to get enthused about any of that. After all, the more one knows about 1978 World Cup, the more it becomes obvious that it was a tournament that never should have been played.

Picture credit : AFP

1) David Winner, *A Dangerous Game* (Financial Times, 21st June 2008).
2) John Brewin and Martin Williamson: *World Cup History 1978* (ESPN News Story 2014).
3) Wright Thompson, *While the world watched*. (ESPN magazine featured story, September 2014)
4) 1978 FIFA World Cup (Wikipedia)
5) Graham Keeley, *After 30 years, the truth behind Cruyff's World Cup disappearance* (The Guardian, 17th April 2008).
6) David Forrest. The political message hidden on the goalposts at the 1978 World Cup (The Guardian, In bed with Maradona, 5th July 2017)
7) John Spurling. The ugly truth of 1978 World Cup (Sabotage times, 5th May 2014).
8) Jonathan Stevenson. The story behind 1978 World Cup (BBC sports, Jonathan Stevenson's blog, 18th may 2010)

Ein Gespräch mit Dr. Veerabhadrarao

Interviewers: Debashis Tripathy and Md Kausar Raza

Can you share something about your childhood?

I was born in a village called Lolla (East Godavari district). It is in the Godavari delta. My father is a farmer. I studied up to 10th standard in a nearby school – NBM Zilla Parishad High School. One of my teachers there, Mr. Srinivas, who taught us mathematics from my 1st to my 10th standard, and my tuition teacher, Mr. Prasad, strongly motivated me to pursue a career in science.

Your name seems a bit long. What do your friends call you?

Bhadra

Subject you liked the most?

Mathematics and Science

As a child, what did you aspire to become?

For some reason, I was (and of course still am) passionate about chemistry. When I was in my 7th standard, we learnt basic chemistry experiments at school; we were distinguishing O2 and CO2 evolution during chemical reactions with burning incense sticks. During a marriage function, I accidentally dropped a piece of calcium carbide in water and saw some gas evolution. So I lit some incense sticks and put them into the evolving gas. It really exploded! I was scared and excited by that experiment. This incident triggered the curiosity in me.

Who inspired you to choose science?

I didn't know I would be a scientist: B.Sc. was the deciding factor. I did my B.Sc. from AP Residential Degree College, Nagarjuna Sagar. Many of my seniors were influential, as they went to prestigious IITs and central Universities for M.Sc. and Ph.D. It was there that I set a scale that I would aim for IIT or IISc and then go abroad to pursue further studies. So mostly, I am influenced by my seniors.

Motivation to choose science, chemistry in particular.

It was the curious childhood experiment with calcium carbide and incense sticks.

"Good work does require sophisticated infrastructure. However, if you are really inquisitive, you can build things and do quality work"

There is a trend in AP that many students opt for a degree either in medicine or in engineering. How did you choose science?

I had a very good rank in EMCET, but due to unfavourable financial conditions, I didn't join. I didn't want to join a local college. Finally, I ended up writing the entrance test for AP Residential Degree College and joined there.

You have finished your M.Sc. from IIT Madras and now you are in IISc. How do you feel about these institutes?

I am glad to have been a part of two top institutes in India. I was interviewed for Int. PhD in IISc. At that time I didn't know which field to choose. So naively I told organic chemistry and after that the situation got tough for me. I didn't get selected in IISc. So, I joined IIT Madras.

Do you believe in luck?

I do believe in luck. I also believe that if you do hard work, luck will follow you. If you work hard, you may fail, but the percentage of failure will be

much less.

Is there any turning point in your life?

I would say getting admitted to AP residential college was my turning point. That was where I met some wonderful and influential seniors. During B.Sc., one of Prof. CNR Rao's students delivered a talk in the institute and it aroused a fascination for nanotechnology in me.

You have worked in some premier institutes abroad. How do you find the top institutes in India (like IISc, IITs) compared to those?

From a research point of view, all these places in India and abroad are the same. When you address a scientific question, I don't see any difference. If you compare EPFL and University of Bern, EPFL is much richer compared to Bern, but the quality of research that is being carried out at Bern is not less than that at EPFL. Good work does require sophisticated infrastructure. However, if you are really inquisitive, you can build things and do quality work.

You have worked in different fields. How easy is it to switch from one field to another?

Once you have command over any particular field, you see what the critical questions are, and the logic these are based upon. Then you can find out the bottleneck in that field. Once you do, it will be very easy for you to proceed.

What is fascinating about your field of research?

There are many unknowns. So, everything is fascinating about this field. There is a lot of difference in bulk and interfacial phenomena. There are intermolecular interactions in the bulk and it shows a collective behaviour, which is quite different from single-molecule properties. When you go to a molecular level some of the properties may be enhanced or diminished. And this is quite interesting. That's exactly what Richard Feynman said, "There is plenty of room at the bottom". In India, there are no experimental research groups working in this field, but there are a few theoretical groups who have been working on single molecular systems.

Who is your role model/inspiration?

Dr. APJ Abdul Kalam was the childhood inspiration. As I am also inspired by Prof. CNR Rao. When we talk about science and philosophy, Richard Feynman. I like his approach to tackling a problem.

How do you feel about IISc and particularly the IPC department?

The campus is very nice. In the department, people are friendly, energetic. And the students are smart, which is most important.

The thing you like the most about IPC.

You can easily approach anyone and ask for a suggestion/help.

You have been to many places, which place do you like the most?

Bern, I have lived there for nearly 10 years, and it is full of greenery and mountains like my own village. For me, it is basically a small village where you know many people, although it is the capital of Switzerland.

Have you ever been to any of the mountains?

I visited Pilatus, Matterhorn, Titlis.

Do you have any hobbies?

Basically, my hobbies do change based my schedule at work. I used to play cricket before I moved to Switzerland.

What do you like to do in your free time.

I like to watch movies. During my stay in Switzerland, I used to go hiking.

Which genre of movies do you like?

Documentary and action movies

If not a scientist, what did you want to be?

Farmer

How you keep yourself away from social media?

I never felt that I am losing anything by not being active on social media.

Happiest moment if you have any.

I feel happy about every small thing I get.

Books that you liked the most.

I do read subject textbooks. But, I am very lazy to read other books like novels and stories.

What suggestions do you like to give to students?

Work hard and be strategic. Without proper planning and strategy, hard work will not yield any good results.

Switzerland is famous for its chocolate and cheese. Which one do you like the most?

Swiss chocolates are very good, but I don't like chocolates. I like swiss cheese and I do miss it.

À votre santé, Prof. Vasudevan!

On 31st July 2019, Prof. S. Vasudevan officially superannuated from IISc, after a long career spanning over 36 years in the IPC department. He joined the institute in January 1983, after a post-doctoral fellowship with Prof. John M. Thomas in Cambridge University, UK. For his doctoral thesis, he worked with Prof. C. N. R. Rao at IIT Kanpur. Over his time in IPC, he has worked with a fine set of PhD students and post-doctoral associates. He has graduated 20 PhD students (4 more would graduate soon) who have gone on to have successful careers of their own, in academia and in industry. He has been on the Editorial Boards of the Journal of Physical Chemistry and the Journal of Chemical Sciences, and has also been a fellow of both the Indian Academy of Sciences and the Indian National Science Academy. He was a recipient of the J. C. Bose National Fellowship as well as the IISc Alumni Award for Excellence in Research (2015) . In IISc, he was the Chair of the NMR Research Centre for several years, has been an associate faculty at SSCU, and briefly chaired IPC as well. When the UG programme was initiated in 2011, he helped set-up the laboratory programmes for the first-year students.

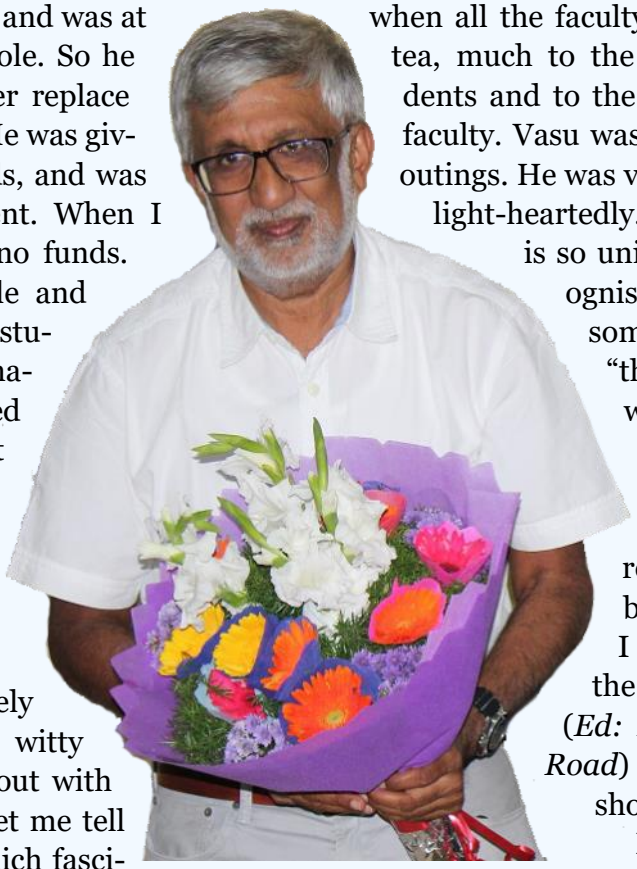
It was a joyous homecoming occasion for several students of the SV group who returned to IPC on 5th July 2019 for a one-day meeting organized by the department in honour of Prof. Vasudevan. Prof. S. Sampath and Dr. Chinmoy Ranjan oversaw the planning of the event . Several ex-students of the Vasudevan group gave scientific talks, viz. Prof. P. A. Joy (NCL Pune), Prof. P. Jeevandandam (IIT Roorkee), Prof. Sudip Barman (NISER Bhubaneswar), Prof. S. Rakshit (IISER Mohali), Dr. M. Jayamurthy (UK), and Prof. N. V. Venkataraman (MEC Hyderabad), and Prof. Vasudevan himself as well. A few colleagues from the campus – Prof. Siddhartha Sarma (MBU) and Prof. S. Yashonath (SSCU) – also gave talks. The last event of the day was the traditional celebratory one where several student and colleagues expressed their admiration of Prof. Vasudevan, and thanked him for his mentorship and friendship. The last word was, of course, reserved for Prof. Vasudevan himself, who gave a memorable farewell address.

The Elixir doffs its hat to Prof. Vasudevan and wishes him well as he continues in IPC as an Honorary Professor. À votre santé, Prof. Vasudevan!

A couple of his long-time colleagues, Prof. A. G. Samuelson and Prof. S. Ramakrishnan, have penned a few words of appreciation for Prof. Vasudevan.

Prof. A. G. Samuelson:

Prof. Vasudevan was the first faculty member I met when I joined the IPC department. He had joined the department in January 1983 and I joined in March. He was my senior. In those days, the senior faculty kept to themselves and there was a very clear three-tier structure. He had joined as a lecturer and was at the bottom of the totem pole. So he was relieved to see another replace him in the pecking order. He was given an empty lab, zero funds, and was waiting for his first student. When I joined, I had no lab and no funds. Vasu had that empty table and chair readied for his first student. So the Chair, to the chagrin of us both, requested me to occupy that seat Vasu had kept for the student until they found a suitable place for me. So I ended up as his first postdoc, in a way.



Vasu is an extremely sharp, knowledgeable and witty person. I won't wear you out with his scientific exploits but let me tell you some other aspects which fascinated everyone. Initially, I was surprised to know how much he knew about Bangalore in just three months. Then I found out that though he was a Ph. D. from IIT Kanpur, he had spent some time in IISc towards the end of his Ph. D. days with Prof. C. N. R. Rao, his mentor. When he joined IPC, he had just returned from England, after a post-doctoral stint in the laboratory of Prof. John M. Thomas in Cambridge, a renowned scientist in the field of heterogeneous catalysis. Vasu did not have a pronounced English accent nor could one make out where he had studied in India before he went to Kanpur. Actually, he had finished his masters in Hindu College, Delhi.

He was my go-to person for everything in Bangalore and was a great help to me as I settled down in IISc. He bought his first two-wheeler and I just blindly followed him: I bought the same model TVS 50 from the same place in Malleswaram. He was a connoisseur of good food. I think he knew every restaurant in Bangalore that was worth eating in. He was very particular about his food, a fact confirmed by his mother-in-law. He spoke so eloquently about food that I was sure he could cook very well, although, until date, I have not seen him cook or tasted food he had cooked.

Coffee time at 10:30 am is a special time when all the faculty of IPC go out for coffee/tea, much to the amusement of some students and to the envy of other department faculty. Vasu was a live wire at these coffee outings. He was very quick-witted and spoke light-heartedly. His style of telling a joke is so unique that we can often recognise it when it is repeated by someone else. We would say "that's a Vasu-joke." Vasu waxed eloquently about politics, science, and everything else in between. It was very obvious that he read a lot. Where he got his books from we couldn't tell. I think he was a member of the British Council Library (*Ed: It still exists on Kasturba Road*) and he knew all the book shops and lending libraries in Bangalore. Now in the age of the internet, it is an open secret where he gets his books from, but it cannot be mentioned in documents.

Vasu was a thorough gentleman. Most of the time, he will not argue with you vehemently if you disagree. One time though, he was very vocal and did not give in, surprising many of us. But soon another beautiful feature of Vasu's character came to the fore. Before the end of the day, he made sure the person he disagreed with was in speaking terms with him. Vasu reached out to him — in a casual manner that is quintessentially Vasu — and the person was so taken aback that the two quickly made up.

It's been a pleasure to know and interact with Vasu for so many years. I wish him the very best for the years to come.

Prof. S. Ramakrishnan:

As I entered our department, I noticed the board with the list of Faculty Members, and noted: S. Vasudevan – Honorary Faculty. *What!* I asked

myself. This can't be true. It feels like just yesterday that I joined the department, and I sense that many us who joined in the 80's and 90's are still young and fit-as-a-fiddle. In particular, Vasudevan who still goes for regular swim every afternoon. The fact is that we were never promised a position for life; such an honour is reserved only for some very special persons.

On reflection, I realize that Vasu's research style and approach reflects the IPC value system of the 90's – work on any problem that appears interesting and doable, but do it very thoroughly, expertly extracting the last bit of information from experiments, even if this meant toiling away together with students for long periods, especially when one gets into newer areas with little prior experience. In taking such an approach, Vasu and his coworkers have developed skills in instrument building (temperature-programmed desorption with hyphenated FT-IR for catalysis), ventured into utilizing newer techniques to comprehensively address questions, for instance solid state NMR to understand ion-transport, and more recently, using new computational techniques to probe fundamental questions concerning ionization of acids in water. Vasu exudes unfiltered enthusiasm for science and a fearless approach toward venturing into newer areas. Along the way, they build the required instrumental facility and the expertise to solve the problem. This approach today appears old-fashioned, since, like the work of an artist, it is a journey of enquiry that most often leads to personal gratification and satisfaction, and is done with little concern about the larger consequences of the outcome or its impact!

Future impact of today's science, when done with utmost care and perfection, is hard to predict. One certain outcome of such an approach, though, is the training that the young coworkers would receive and will carry with them wherever they go, something that Vasu will have certainly taken a great deal of satisfaction from. All I can say is – There goes yet another from the gang of the previous millennium!

Vasu: Here's wishing you all the very best. We will miss your great sense of humor and the timely repartees during the formal meetings, but I am sure we will continue to enjoy them on the numerous informal occasions.

The Elixir thanks Mr. Aman Jindal for the photograph and the list of students of the SV group, Prof. S. Ramakrishnan and Prof. A. G. Samuelson for taking time to write about Prof. Vasudevan for this magazine, and Prof. E. Arunan and Aman Jindal for further inputs.

(L-R) Sudip Barman, Supan, N. V. Venkatraman, Manoj Kumar, Aman Jindal, Anil Kumar T., Ritu Ghanghas, Sohel Reja, M. Jayamurthy, S. Vasudevan, Sabyasachi Rakshit, Saumi Ray, L. Mohanambe, P. Jeevanandam, S. K. Tiwary, P. A. Joy, and Vikrant Naik.

In response to the invitation for a rather unusual reunion of all-time greats

Contributed by **M. Nethaji***

Newton said he'd drop in.

Socrates said he'd think about it.

Ohm resisted the idea.

Boyle said he was under too much pressure.

Darwin said he'd wait to see what evolved.

Pierre and Marie Curie radiated enthusiasm.

Volta was electrified at the point.

Pavlov positively drooled at the thought.

Ampere was worried he wasn't current enough, though alternately, none were.

Edison thought it would be illuminating.

Einstein said it would be relatively easy to attend.

Archimedes was buoyant at the thought.

Morse said, "I'll be there on the dot. Can't stop now, must dash."

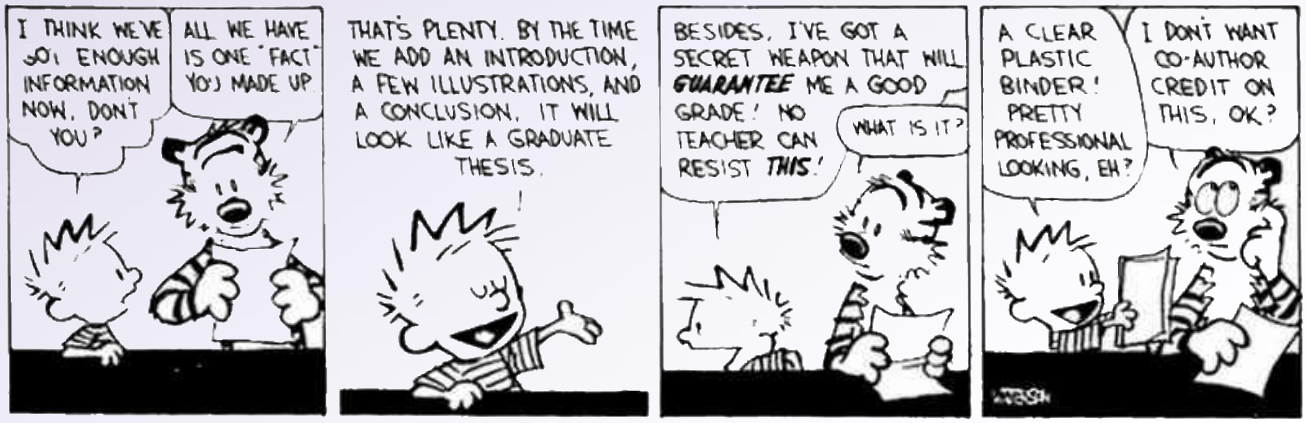
Hertz said he planned to attend with greater frequency in the future.

Wilbur Wright accepted, provided he and **Oliver** could get a flight.

Aryabhatta said there was zero chance of him showing up.

Marconi said he would listen to the report on the wireless.

Pythagoras refused because he thought that the organizers were not looking at the reunion through the right angle.



* Source is unknown.

A Very Special Visit

Garima Tiwari, Mrinal Arandhara, and Subharaj Hossain

Alumni only (L-R) *Row 1:* R. V. Raghavendra, V. Chandrasekhar, D. K. Koppikar, S. S. Krishnamurthy, Sudha Gopalakrishna, Gayathri Devi Gururaj, E. J. Padma Malar, K. S. Godhavari; *Row 2:* S. Manoharan, N. Rajasekar, Girijashankar Pingale, G. Sudesh Kumar, K. Mohan Das, B. S. Sudhindra, Gururaj V. Kulkarni, K. Sridhar, Nandakumar. *Row 3:* Sreekantan, Mohanrao, P. Sridhar, Joy Mukhopadhyay

Sunday, 17th November 2019, was a very special day for IPC. Nearly 25 of our alumni who strode through the vaunted corridors of the department in the 70s and 80s decided to meet with each other after several years. And they chose to do so in those very spaces where their friendships were forged. The department welcomed these alumni back in an event held in the Lecture Hall, which was also attended by current students and faculty as well as some of the senior faculty, Profs. S. S. Krishnamurthy and Prof. V. Krishnan, who taught/mentored them in that era.

How did so many alumni come together? Well, several got in touch with each other in a WhatsApp group set-up by Dr. Mangalam Ramanathan earlier this year. The group now as about 60 members. The interactions over that medium led the visit to IPC, the idea having been mooted by Dr. N. Rajasekar. The full list of alumni who visited is given on page 35. Dr. N. Rajasekar and Dr. R. V. Raghavendra coordinated the visit, with Prof. E. Arunan and Dr. K. Geetharani pitching in from the department's side.

During the interaction in the IPC Lecture Hall, the alumni introduced themselves to the current students and faculty, and shared their experiences and memorable moments from their campus life. They emphasized the self-grooming of every individual by developing independent ideas, striving to gain deep knowledge, and honing practical skills. In the words of Dr. Gayathri, "PhD is just a stepping stone in our lives. What matters next is how we carry forward with the knowledge we have gained here." It was an enlightening event in the sense that all the alumni have worked in diverse fields, in various academic institutes and industries. Dr. Gopala Krishna Murthy advocated that the interaction between research institutes and industries is an immediate need of the hour.

Dr. Sudha, who recently retired from the faculty at St. Joseph College, Bangalore, talked about the importance of proper communication in fully delivering concepts and ideas to students and also about the difficulties faced by a teacher in handling diverse classes of students. Dr. Sudhindra shared his self-published book titled *U Can Do Mathematics using FOLK-CAP way … Making Maths Digestible to Billions*, designed to improve the quality of mathematics education in India. Several alumni have run/are running their own firm and some of them are consultants for some renowned industries as well. Dr. Sridhar told the audience about his journey from a mechanical engineering project to becoming an expert in column chromatography. He reiterated

that every goal can be achieved by hard work and consistency.

Many alumni reminisced about the wonderful time had spent in the gymkhana, in tea-time chit-chats, in music clubs, and simply enjoying the lush green campus. Some also recalled their active involvement in the Mess Committee. Prof. P. K. Das, chairman of Chemical Sciences Division gave a short presentation about the progress of the Division over the past few years. Dr. Rajasekar concluded the program with his message to the audience: "Learn and prosper in your respective fields, enjoy life at IISc and feel free to contact us for any help anytime."

Other recent alumni visits::

Two other students from a slightly later period in time stopped by IPC recently. One was Prof. S. R. Narayanan visited his alma mater on 16 May 2019. He gave a lecture on *Storing energy in Flow Batteries – Advances, Challenges and Prospects*, followed by an interactive session with the students. He obtained his PhD in 1988 under the guidance of Prof. S. Sathyanarayana, a former professor of IPC who worked in the field of electrochemistry. Prof. Narayanan heads a prolific group at the University of Southern California, Dornsife.

The other was Prof. Francis D'Souza, a former PhD student (graduated in 1992) of Prof. V. Krishnan, visited IPC on 23 October 2019. Prof D'Souza gave a talk on "Carbon Nanomaterials in Light Energy Harvesting". One of his lab colleagues from that era, Prof. P Gautam (Emeritus Professor, Anna University), was also present. Prof. D'Souza's research at University of North Texas covers wide areas of chemistry, nanophotonics and material science.

Prof. S. R. Narayan

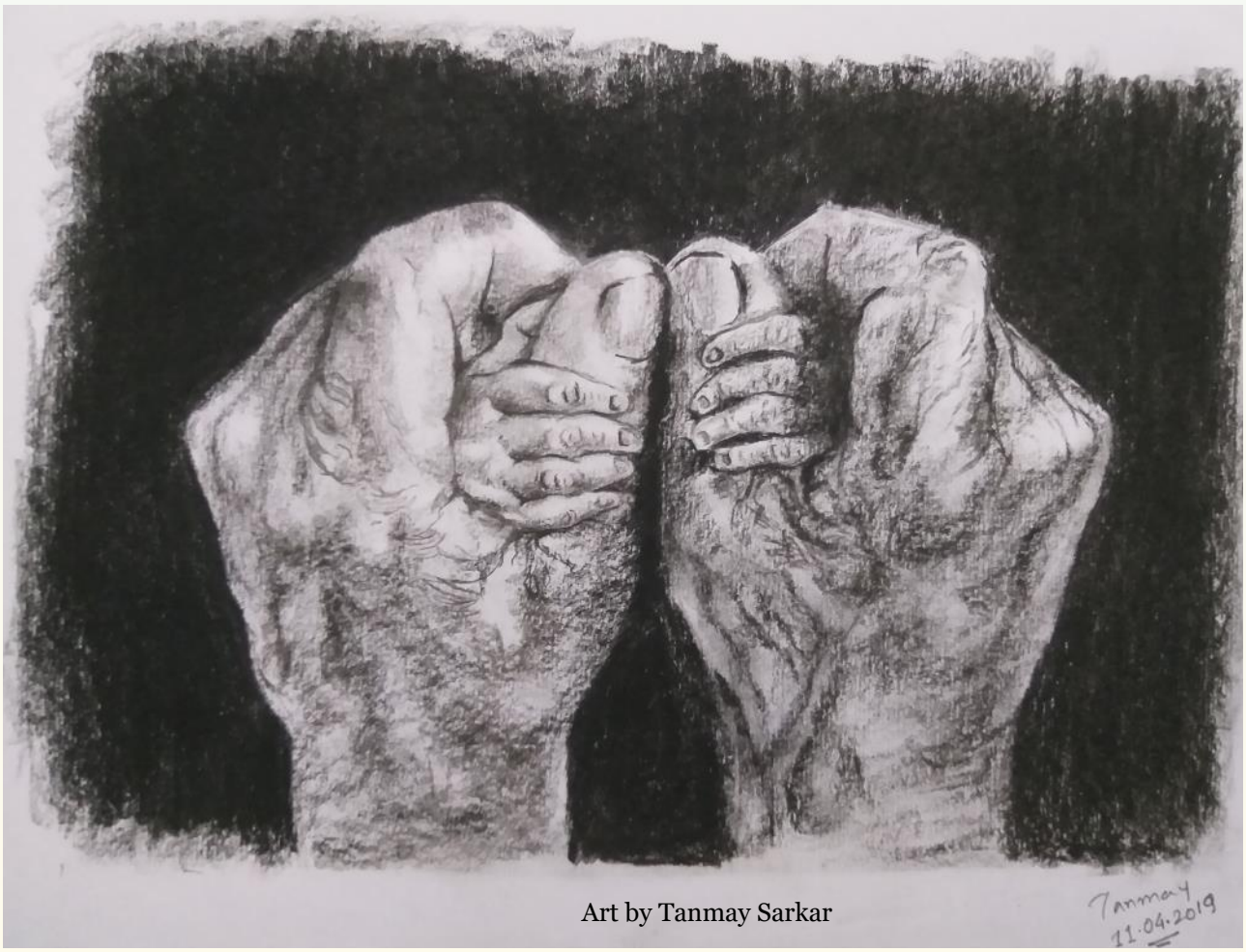
Prof. Francis D'Souza

The oldest visitor IPC has seen is Dr. Jawaharlal Vaid, who just dropped in to say hello in May 2018. He had joined IPC in 1951. At that time, our department had 12 students and 8 faculty. It was called General and Applied Chemistry then, not IPC. Of course, the current students chatted with him and even got him a cake!

We've had much younger alumni visit us, too. During the very recent IISc Alumni Meet 2019, Dr. Brij Kishore and Dr. Nusrat Sanghamitra also visited. They were PhD students of Prof. N. Munichandraiah and Prof. A. G. Samuelson, respectively, and graduated in this century.

The IPC Department looks forward to welcoming more of our alumni in the years to come.

Name	Year of Joining	Research Advisor
Dr. G. Sudesh Kumar	1977	Prof. V. Kalpagam
Dr. V. Mohan Rao	1976	Prof. H. Manohar
Prof. Sudha Gopalakrishna	1976	Prof. T. R. N. Kutty
Dr. D. K. Koppikar	1974	Prof. S. Soundararajan
Dr. Girijashankar Pingale	1972	Prof. A. K. N. Reddy / Prof. S. Sathyanarayana / Prof. S. K. Rangarajan
Dr. Joy Mukhopadhyaya	1975	Prof. B. Nandi / Prof. V. Kalpagam
Dr. K. Mohan Das	1977	Prof. K. Kishore
Dr. Nandakumar	1975	Prof. Uma Shankar Nandi
Dr. P. Sridhar	1976	Prof. R. S. Subramanya
Prof. S. Manoharan	1977	Prof. D. N. Satyanarayana
Dr. R. V. Raghavendra	1973	Prof. G. V. Ananth Iyer
Dr. Sreekantan	1974	Prof. C. C. Patel
Dr. N. Rajasekar (Raj)	1977	Prof. S. Soundararajan
Dr. E. J. Padma Malar	1974	Prof. A. K. Chandra
Dr. K. S. Godavari	1979	Prof. G. V. Ananth Iyer
Dr. B. S. Sudhindra	1970	Prof. A. K. Chandra
Prof. V. Chandrasekhar	1977	Prof. S. S. Krishnamurthy
Dr. Gayatri Devi	1976	Prof. D. N. Satyanarayana
Dr. Gururaj V. Kulkarni	1972	Prof. C. C. Patel
Dr. Gopala Krishna Muthy	1972	Prof. M. Subba Rao
Dr. K. Sridhar	1983	Prof. K. Kishore
Dr. Arun K. Kashyap	1972	Prof. V. Kalpagam
Dr. P. Ramabrahmam	1976	Prof. S. S. Krishnamurthy
Dr. Siva Ganapathiappan	1980	Prof. S. S. Krishnamurthy



Art by Tanmay Sarkar

Special Seminars

Date	Speaker	Topic
05-11-18	Dr. Ashok Keerthi The University of Manchester, U.K.	Synthetic Engineering of Graphene Nanoribbons and 2D Channels
12-11-18	Prof. Satish Vasu Kailas Indian Institute of Science, Bangalore	Climbing up the 'Sustainable/Engineering' Ladder
16-11-18	Prof. Kana M. Sureshan Indian Institute of Science Education and Research (IISER), Thiruvananthapuram	Covalent and Non-covalent Polymers: Syntheses and Applications
23-11-18	Prof. A. R. Ravishankara Colorado State University, U.S.A	Contributions of Aerosols to Climate Change and Air Quality: India as a Case Study
04-12-18	Dr. Arunava Gupta University of Alabama, U.S.A	Semiconducting Chalcogenide Nanomaterials for Energy Applications
10-12-18	Dr. Harshad Pathak Stockholm University, Sweden	Experimentally Studying Supercooled Water and Relating its Molecular Structure to Bulk Properties
12-12-18	Prof. Himansu S. Biswal National Institute of Science Education and Research (NISER), Bhubaneswar	Non-Covalent Interactions in the Hydrophobic Core of Proteins
19-01-19	Prof. Dhruv Raina Jawaharlal Nehru University, New Delhi	A Radical Chemist on the Dilemmas of Indian Higher Education and the University: Reflections from the Early Twentieth Century
11-02-19	Dr. David Scheschkewitz Saarland University, Germany	Unsaturated Main group Species: Beyond the Carbon Copy
12-02-19	Dr. Maximilian Fichtner Helmholtz Institute Ulm (HIU) & Karlsruhe Institute of Technology (KIT), Germany	Alternative Battery chemistry – Developments and Challenges
18-02-19	Prof. Sason Shaik Hebrew University of Jerusalem, Israel	Oriented Electric Fields – New Effectors in Chemistry
01-03-19	Dr. Ashish Lele Reliance Industries Ltd., Mumbai	Rheology of Entangled Polymers: Bridging Molecular Topology and Industrial Processing

Date	Speaker	Topic
07-03-19	Dr. Sushant P. Sahu Louisiana State University, U. S. A.	Radiation-Driven Approaches and Materials for Water Treatment Technologies and Beyond
13-03-19	Dr. Arivazhagan Rajendran Kyoto University, Japan	DNA Origami: Self-Assembly and Applications to Single Molecular Analysis
14-03-19	Dr. Pranav R. Shirhatti Tata Institute of Fundamental Research (TIFR), Hyderabad	Gas - Surface Scattering Experiments: A Tool for Understanding Elementary Steps in Surface Chemistry and Probing Surfaces
22-03-19	Dr. C.R. Chandrashekar NIMHANS, Bangalore	How to Improve Mental Tranquility and Efficiency
11-04-19	Dr. P. Rajamalli University of St Andrews, U. K.	Purely Organic Thermally Activated Delayed Fluorescence Efficient Organic Light Emitting Diodes (OLEDs)
23-04-19	Dr.Pavan Kumar Bosukonda University of Bristol, U. K.	Buoyant Microcapsules: Simple motility to Complex Autonomous Behaviour
16-05-19	Prof. S. R. Narayanan University of Southern California, U. S. A.	Storing Energy in Flow Batteries - Advances, Challenges and Prospects
11-07-19	Prof. D. Goswami Indian Institute of Technology, Kanpur	Femtosecond Optical Tweezers in Complex Systems
16-07-19	Prof. Christopher W. Jones Georgia Institute of Technology, U. S. A.	Amino silica Materials as a Platform for Separations and Catalysis
16-07-19	Prof. Phillip E. Savage Pennsylvania State University, U. S. A.	Biomass Valorization and Catalysis in Hot Compressed Water
02-08-19	Prof. G. Naresh Patwari Indian Institute of Technology Bombay, Mumbai	Many Facets of Hydrogen Bonding
23-08-19	Ms. M. Bhagyalaxmi Office of Career Counselling and Placement, Indian Institute of Science, Bangalore	Exploring Work Opportunities in Industries (Biology/Chemistry) –PhD and Post Doc
28-08-19	Prof. Holger Braunschweig Institut für Anorganische Chemie, Julius-Maximilians-Universität	Borametallomimetics – Activation of Small Molecules by Low-Valent Boron Species

Date	Speaker	Topic
03-09-19	Dr. Hema Chandra Kortamarthi Massachusetts Institute of Technology, U. S. A.	Force Spectroscopic Investigations on In Singulo Mechanisms of Protein Mechanics and degradation by ATP-Dependent Molecular Motors
03-10-19	Dr. Basker Sundararaju Indian Institute of Technology, Kanpur	Sustainable Molecular Architectures Under 3D Transition Metal Catalysis
09-10-19	Dr. Akshai Kumar Indian Institute of Technology, Guwahati	Pincer-Metal Complexes in Catalytic Conversions: Synthesis of High Value Fuels and Commodity Chemicals
18-10-19	Dr. Devendra Mani Ruhr University Bochum, Germany	Exploring and Steering Chemistry in Helium Nanodroplets
23-10-19	Francis D'Souza University of North Texas, U. S. A.	Carbon Nanomaterials in Light Energy Harvesting
07-11-19	Dr. T. Thirunarayanan Center for Traditional Medicine and Research, Chennai	SIDDHA: A Living Tradition
22-11-19	Prof. Richard Zare Stanford University, U. S. A.	Water, So Common, So Mysterious
05-12-19	Dr. Ritesh Haldar Karlsruhe Institute of Technology, Germany	Surface-anchored thin films of functional metalorganic/organic materials
06-12-19	Prof. Alan S. Goldman Rutgers University , U. S. A.	Catalytic Activation and Functionalization of C-H Bonds by Transition Metal Complexes
09-12-19	Prof. Michito Yoshizawa Tokyo Institute of Technology, Japan	Polyaromatic Nano-capsules: from Rational Design to Host Functions
12-12-19	Prof. Srinivasan Ramakrishnan University of California, U. S. A.	Achieving Stability in High Energy Battery Matrials via Interfacial Engineering
19-12-19	Prof. R. Srinivasa Murthy NIMHANS, Bangalore	My Emotional Health: My Choice
20-12-19	Prof. Tapan K. Paine Indian Institute of Cultivation Science, Kolkata	Bioinspired Approaches to Selective Catalytic Oxidations by Nonheme Iron Complex

High achievers

Dec 2019:

Prof. S. Sampath has been elected a Fellow of the The World Academy of Sciences.

Nov 2019:

Dr. K. Geetharani would be joining the Early Career Advisory Board of *Chemistry — An Asian Journal* starting from 2020.

Nov 2019:

Prof. G. Mugesh received the ***11th Infosys Award in Physical Sciences***. The award recognizes "his seminal work in the chemical synthesis of small molecules and nanomaterials for biomedical applications." This is the first Infosys award to a faculty from Chemical Sciences in IISc.

Sep 2019:

CyCa OncoSolutions, founded by **Dr. Nusrat Sanghamitra**, an alumnus of IPC (AGS Lab) was awarded third prize at the She Loves Tech Global Startup Competition 2019 held in Beijing on September 14. The startup is based on a nanotechnology driven molecular drilling device which delivers molecular cargoes directly into cells, thus transforming drugs which were earlier found to be poisonous in vivo, into remedies. Mentored by Kerala Startup Mission (KSUM) and operating from two branches at Pune (India) and Cork (Ireland), the technology is capable of improving the quality of life for nearly 15 million cancer patients across the globe.

Sep 2019:

Dr. K. Geetharani was a recipient of the INSA Young Scientist Award and the NASI Young Scientist Platinum Jubilee Award for the year 2019.

Sep 2019:

Dr. Namrata Singh from the Mugesh group was awarded the IIT Bombay Metrohm Young Chemist Award 2019 for Innovation in Research. The award was given for her research on uncovering the role of an antioxidant nanozyme that provides cytoprotection in Parkinson's Disease model.

Aug 2019:

Prof. E. Arunan received the National Prize for Research in Chemical Spectroscopy and Molecular Structure, awarded by the C. N. R. Rao Education Foundation, on 16th August 2019.

May 2019:

Md. Kausar Raza from the ARC group was selected to receive the *SBIC Student Travel Grant* to attend the International Conference on Inorganic Biological Chemistry 2019 (August 11-16), which took place in Interlaken, Switzerland.

Jul 2019:

Arijit Das from the Arunan group received the Best Poster award at the *Manchester International Symposium* on "Highly Excited States, Many-body and Non-covalent Interactions", held between 19th and 21st June, 2019. Congratulations, Arijit!

Congratulations to all!

# of IPC

Apr 2019:

Recent work carried out in **Prof. Mugesh's lab** on increased uptake of proteins by cells was featured in *The Hindu*.

Apr 2019:

A paper by **Dr. Sanjoy Mukherjee** and **Prof. P. Thilagar** was featured in a *Chemical News* commentary by Derek Lowe.

Feb 2019:

Dr. Geetharani was featured in the IISc website. Her interview is available online.

Feb 2019:

Ms. Rinkumoni Chaliha from the Jemmis group received the *Best Poster Presentation award* at the TCS-2019 conference held at BITS-Pilani recently (Feb 13-16, 2019).

Jan 2019:

Mr. Orodepo Gabriel Ogunsola from the Ramakrishnan group was awarded the best poster prize at the SPSI MACRO-2018 Conference held in IISER-Pune & CSIR-NCL Pune in December 2018.

Jan 2019:

Prof. E. D. Jemmis was awarded the *Year of Science Chair Professorship* by SERB.

Feb 2019:

Mr. Souvik Mandal from the Geetharani group received the *RSC poster prize* and **Dr. Namrata Singh** from the Mugesh group received the *ACS poster prize* at the 24th CRSI National Symposium in Chemistry held at CSIR-CLRI, Chennai, recently (Feb 8-10 Feb, 2019).

Jan 2019:

Prof. Umapathy group developed a spectrometer for rapid detection and identification of bacteria, called RAIDER-B. They have transferred the technology to DRDO, Bangalore.

Dec 2018:

Ms. Ritu Ghanghas from the Vasudevan group was selected to be part of team India for the Asia-Oceanic Ultimate (Frisbee) and Guts Championships that would be held in Shangai, China, in July 2019.

Dec 2018:

Ms. Chirasmita Bhattacharya from the Jagirdar group received the 2019 Future Research Talent travel award conferred by the Australian National University.

Dec 2018:

Dr. Rameshnaidu Jenjeti from the Sampath group received the Karnataka DST Nanoscience Fellowship award for the year 2018. The award was instituted by the Department of Science and Technology, Govt. of Karnataka.

So when's the party?

Al(l)chemists' Club Activity Report 2018-19

Rinkumoni Chaliha (ex-head honcho of the club)

The Al(l)Chemists don't just do the freshers' welcome party (Sunshine) and try to organize a group trip to someplace. They also host some other events, frequently lectures, which are sometimes scientific and sometimes not. The 2018-19 Al(l)chemists did their fair share during their tenure. This is their work report.

We hosted Prof. Satish V. Kailas (Dept. of Mechanical Engineering, IISc) who spoke about "Climbing up the Sustainable Science/ Engineering Ladder" on 12 November, 2018. The talk addressed several popular misconceptions regarding sustainable development and discussed some attempts towards it.

The mental health of students is coming up as a serious issue in current times. The Club organised a talk on "How to Improve Mental Tranquility and Efficiency" by psychiatrist Dr. C. R. Chandrashekhar from NIMHANS, Bangalore, on 22 March 2019. In the talk, he discussed about depression, anxiety and insecurity as clinical conditions, and suggested ways to prevent and tackle them in the present times.

The highlight of our year's activity was the symposium and panel discussion titled "Balance for Better: Empowering women." This programme, organized on 6th April 2019, included a series of brief talks by Prof. Rohini Godbole (CHEP), Prof. Dipshika Chakravortty (MCBL), Prof. Mrinalini Puranik (Unilever) and Dr. R. Nirmala (IISc Health Centre), which shed light on issues faced by working women in general and women in STEM in particular. The panel discussion on "Women in leadership" focused on several factors that stall the professional advancement of women in science despite being very well qualified, and discussed possible measures to set this right.

A talk titled "Exploring Work Opportunities in Industry" by Ms. M. Bhagyalakshmi from the Office of Career Counselling and Placement (OCCAP), IISc, was held on 23 August, 2019. She discussed several opportunities in industry, after a Ph. D. or post-doctoral fellowship, relevant to the members of the department. The talk also elaborated on the working of the placement cell of the Institute, its process and policies, of which many of us were unaware.

Finally, the Club organized the regular annual events including the Kaushal Kishore Memorial Lecture (given by Dr. Ashish Lele, Reliance India Ltd.), the S. K. Rangarajan Memorial Lecture (given by Prof. Dhruv Raina, JNU), and the IPC day as well.

The members of Al(l)chemists' Club 2018-19 thank Dr. K. Geetharani, the President of the club for her guidance, the Chairman, Prof. E. Arunan, the former Chairman Prof. S. Umapathy, as well as the whole department for their support and co-operation which enabled us to conduct all the events successfully.

Ed – The Al(l)chemists' Club also organized the sports day on 5th January 2019. We'll let the photos of the event on the facing page tell that story.

Answers to Saraswati's Daughters

1)	Lise Meitner	6)	Maria Goeppert Mayer
2)	Maryam Mirzakhani	7)	Asima Chatterjee
3)	Kamala Sohonie (Bhagvat)	8)	Dorothy Hodgkin
4)	Maude Menten	9)	Gertrude B. Elion
5)	Amalie Emmy Noether	10)	Ada Lovelace

THESIS DEFENSES

Lakshmi R.V.
Dec, 26, 18 (SS Lab)

Anupam Bera
Mar.03, 19 (AB Lab)

Jayashree Bhagabati
Sep. 27, 19 (MS)-(BRJ Lab)

Aishani Ghoshal
Nov. 13, 19 (BJC Lab)

Akshita Jain
Nov. 15, 19 (MS)-(PT Lab)

Ramesh Naidu Jenjeti
Dec. 05, 19 (SS Lab)

Bijnaneswar Mondal
Dec. 10, 19 (PSM Lab)

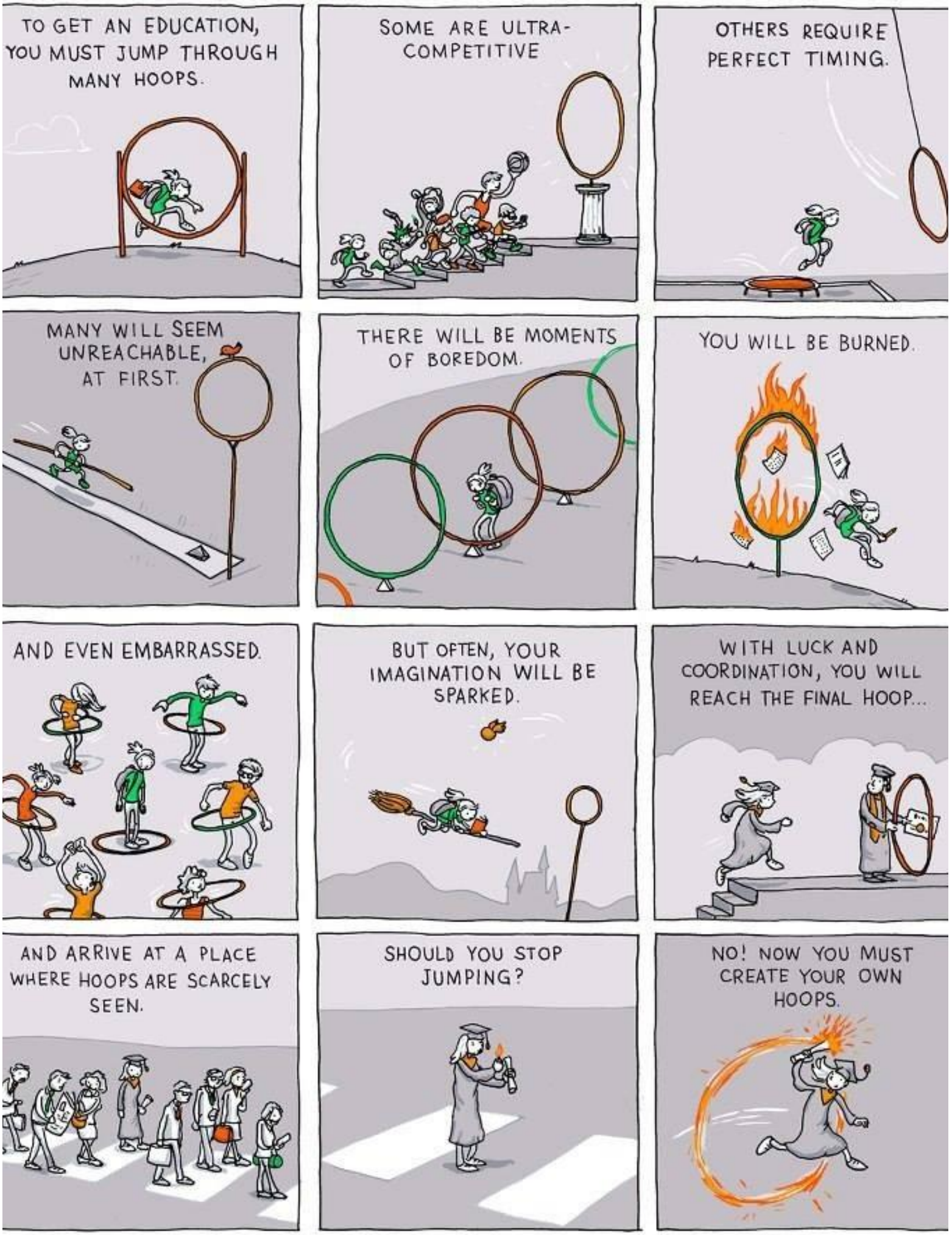
Sourav Ghosh
Dec. 13, 19 (GM Lab)

Ramkrishna Sarkar
Dec. 19, 19 (SRK Lab)

Harinarayana Ungati
Dec. 19, 19 (GM Lab)

Rupak Saha
Dec. 20, 19 (PSM Lab)

MESSAGE TO A GRADUATE



GRANT SNIDER


Photo effects by Saibalendu Sarkar